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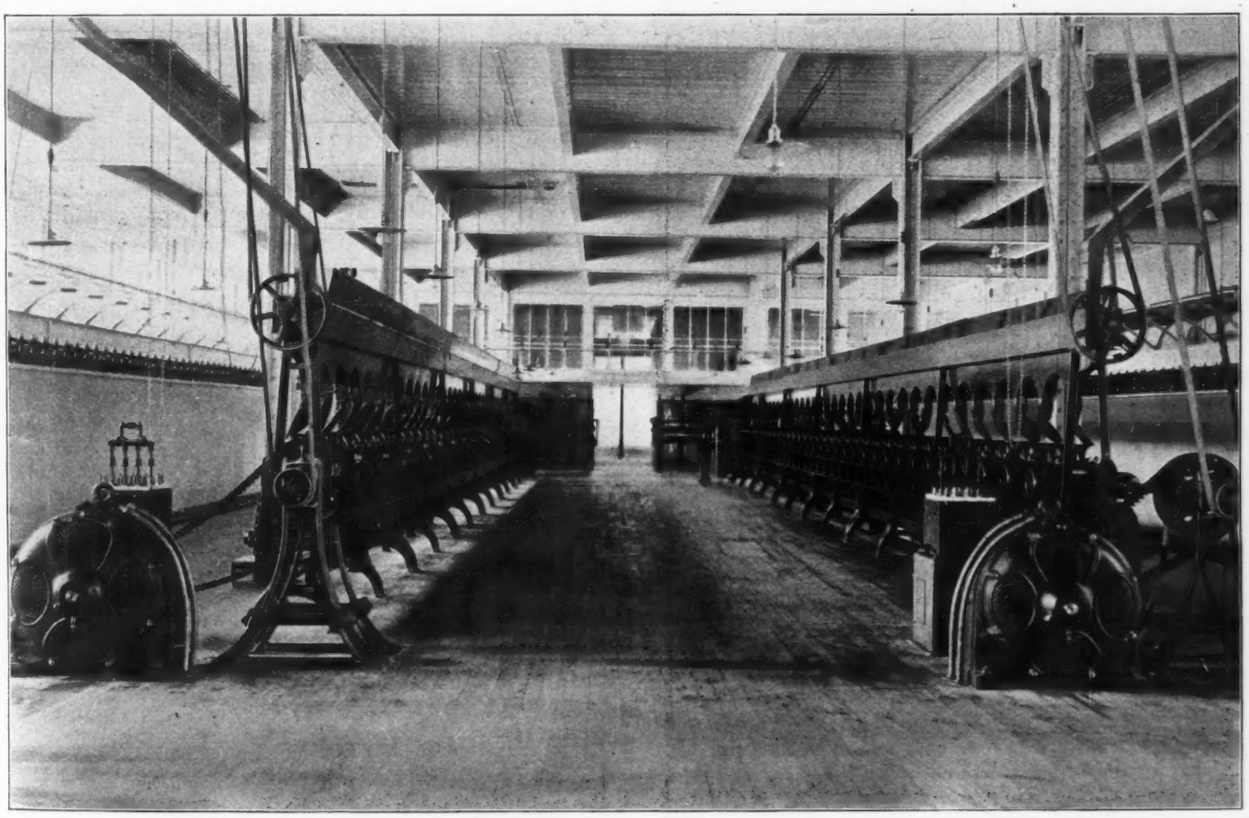
A Modern Electrically Equipped Manufacturing Plant

Electric lighting is now recognized as the most satisfactory system of illumination for all great manufacturing plants. Small electric motors directly connected to individual machines are undoubtedly the most efficient and at the same time most economical and flexible system of furnishing power in such manufacturing establishments. Recently electricity has been utilized in many cases in new applications that have been found to possess as great advantages over the older and less economical systems as the modern electrical illumination and individual motor drive for machines are superior to the old systems of illumination and power transmission.

One of the most complete electrically operated manufacturing plants in San Francisco was unfortunately destroyed in the recent conflagration. For the past five years the Mutual Label and Lithograph Company have had in operation an electrical system of power distribution which included all machines of every character. The large presses were driven by electric motors, usually with a short belt drive inasmuch as the belt system was found to be in many ways superior to the direct connection of the motor to the press or other machine through gearing.

The speed control, particularly for the presses, was most complete. All the power required for the operating of the plant was supplied by the San Francisco Gas & Electric Co. at 2,200 volts, 3-phase, 60 cycles. A 150-horsepower induction motor was directly connected to two direct current generators, one on either end of the induction motor shaft. The above generators were of 60 kilowatts normal capacity, the voltage of one being about 90, while the other was about 130. These two generators were connected as a three-wire Edison system, thereby giving three operating voltages, viz.: 90 volts for the low voltage generator; 130 volts for the high voltage generator, and 220 volts across the outside leads. Each motor control included a rheostat for adjusting the field current of the motor, and each motor field was excited from the 220-volt system. This arrangement made it possible to obtain a wide range of speed for the presses and other machines at all loads with a minimum expenditure of power. The entire system gave most satisfactory operation, and will undoubtedly be reproduced upon a much larger scale in the new plant of this company.



ELECTRICALLY DRIVEN SHREDDING MACHINES

The extensive use of electricity in a much broader field is to be found at the plant of the Natural Food Company at

Niagara Falls. This factory is entirely equipped with electrically operated machines, and embodies many new and important features. Both alternating and direct current are used to operate the electrical elevators, machines, tools and blowers, while a storage battery auxiliary has been installed for operating the miniature railway from the model kitchen to the dining room, which are a part of the general equipment. All the power for operating the entire plant which includes approximately 2,500 16-candlepower lamps, is supplied from the power house of the Niagara Falls Power Co., distant about one-half mile from the factory. For about one-half this distance the power is transmitted overhead to the lightning arrester house from which the current is brought to the factory underground using lead covered cables.

There are two transformer or convertor rooms, each of which supplies one-half of the power required for the entire plant. In the east transformer room there are two 75-kilowatt transformers to supply the current required for the electric lighting, two 150-kilowatt transformers to furnish power for operating the electric motors, and two 100-kilowatt transformers to reduce the line voltage to that required for the rotary converter. These transformers reduce the supply

ELECTRICAL COOKING APPLIANCES IN DINING ROOM

voltage from 2,200 to 440 volts for the alternating current motors, from 2,200 to 110 volts for the electric lighting system, and from 2,200 to 183 volts for the rotary converter. The switch board contains, in all, nine panels of blue Vermont marble, the total length of the board being 20 feet, and the height 7 feet. The first two panels contain the 2,200-volt switches for controlling the transformers, and also the necessary meters, ground protectors, pilot lamps, etc. The next three panels contain the 440-volt switches and meters for the alternating current induction motors, while the remaining four panels are used for the lighting service at 110 volts.

The west transformer or converter room is practically a duplicate of the east transformer room above described, with the exception that a motor generator set is used in this room in place of the rotary converter. This motor generator set is used to supply direct current for the storage batteries and also for current for operating the telephone system.

The current supplied is 2-phase, 25 cycle, alternating, and enters the east transformer room at 2,200 volts potential. It passes first to the terminal switch board which is equipped with selector switches, single-phase wattmeters, and automatic circuit breakers.

From this board the current is taken to a panel equipped with automatic oil switches, and from this it is distributed to the different points at which the transformers are located.

The present transformer installation has a capacity of 2,530 kilowatts. This is divided between eighteen transformers ranging in size from 75 kilowatts to 15 kilowatts. All transformers are of the oil cooled type.

The 150-kilowatt rotary converter situated in the east transformer room furnishes a 220-volt direct current for operating four elevators and several direct current ventilating fans.

On the third floor of the factory are situated four electric baking ovens. Each of these ovens requires 280 kilowatts, and is supplied by two 140-kilowatt transformers. The transformers are equipped with potential regulators, allowing a variation of from 80 to 127 volts on the secondary. From the east transformer room the power is carried on to the baking transformers by two independent sets of cables. These cables are 300,000 C. M. copper, having 7/32-inch paper insulation.

The electrical kitchen is equipped with the latest cooking apparatus, and is used for preparing the numerous dishes for visitors. The balcony which surrounds the main floor is provided with seats for a large number of guests and a miniature electric railway is fully equipped with trains, stations, guards, and electric switches, and is used for serving the visitors with tasty luncheons. The numerous guests are seated at small white tables, to each of which travels a small electric car. A menu card is provided at a small desk at the table with convenient electric buttons, by means of which the order is given. The tiny car automatically travels to the electric kitchen on the main track, and after being supplied with the necessary order, returns automatically, and is shifted from the main track to the guest to whom it belongs. A neatly arranged block system is arranged, which prevents any disaster or accident, and the car moves back automatically to the station from which it started, with the luncheon attractively served, the car itself serving as a neat table for the use of visitors.

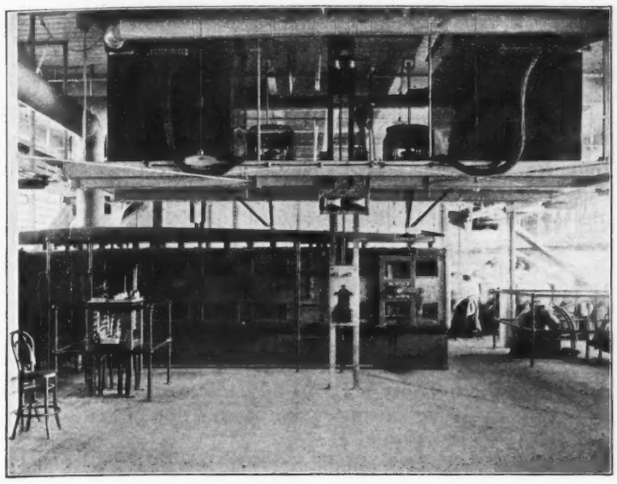
The electric cooking equipment is most complete, and a dining room is provided for the women employes. Tasty dishes of various kinds are served to the operatives, while a library and parlor is provided with comfortable chairs, a piano, and abundance of reading matter. All employes and visitors are frequently invited to a well appointed lecture room, which is provided with an electric stereopticon, as well as both direct and alternating current for demonstration purposes. The most approved cooking utensils, chafing dishes, coffee, and tea pots and other utensils are used for the demonstration of electric cooking.

The new wheel pit and power house of the Niagara Falls Power Co. is fast nearing completion, at which time the total output of electrical energy will be increased to 100,000 horsepower, and a number of important manufacturing plants will soon be established along the Niagara frontier.

Two hundred and twenty-volt current is used for operating four electric elevators as well as numerous fans and the electric stereopticon in the lecture room. A completely equipped machine shop is provided with electrically driven lathes, shapers, grinders, and planers, and all of the necessary repairs are made within the building. A hot air fan system is utilized for heating and ventilating, the blowers being operated by both electricity and steam. One engine of 100-horsepower drives two blowers sixteen feet in diameter, providing a complete change of air in fifteen minutes. Electric motors of 10 horsepower capacity with silent chain drive operate four blowers for evaporating purposes.

The electric cooking transformers have each a capacity of 140 kilowatts, reducing the pressure down to 80 or 120 volts, as desired, the potential being controlled by regulators in the primary. Two of the four electric Otis elevators are operated by 50 horsepower motors and are used for passenger service, while the two remaining freight elevators are driven by 25 horsepower motors. The electric cooking apparatus is wired non-inductively and is intended to operate on a circuit of 110 volts, 25 cycles.

A 48-inch direct connected ventilating fan is used for exhausting the air from the hallway in Administration Building. The fan is operated by a 220-volt circuit supplied from a 150-



ELECTRICAL OVEN, TRANSFORMERS ABOVE SUPPLYING CURRENT FOR HEATING, OIL SWITCHES AND POTENTIAL REGULATORS ON PLATFORM BETWEEN TRANSFORMERS

kilowatt rotary transformer in the transformer room. The air is forced into the offices by two large fans direct connected to a 220-horsepower engine, and the offices discharge the air again into the hallway where it is taken out by this and other fans, there being a total of five ventilating fans in all in the entire plant.

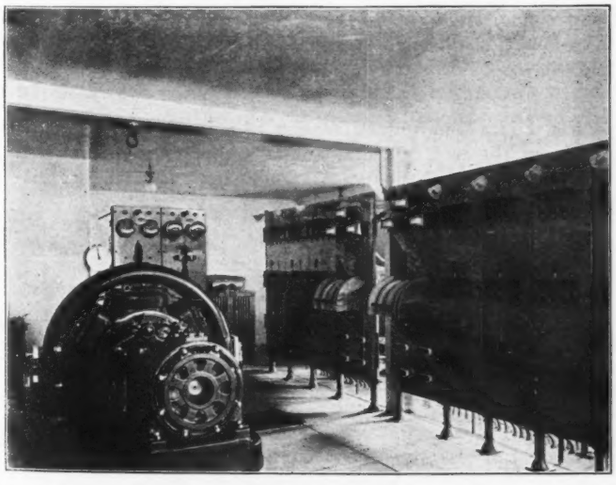
In the sealing machines on the fifth floor of the main conservatory at the east end the cartons enclosing the finished product are sealed and put in cases.

Two 3-horsepower induction motors are located on the ceiling eighty feet away from the operating switches, which are located at the operating end of the machines.

A carton elevator brings the cartons up from the second floor or main shredding floor. They are transferred from this carton elevator to the sealing machine. The carton elevator is also driven by a small motor.

The cooking room is where the wheat is washed and put in the large tumblers and lowered into the kettles, which are steam jacketed, where it is cooked for thirty minutes before passing to the floor below.

These tumblers filled with wheat are handled by a special electric crane, which has a capacity of 2,000 pounds and a 31-foot span. It is operated by three induction motors of 24 horsepower each, built especially for this purpose. They are operated on a 440-volt, 25 cycle current. There are two



EAST TRANSFORMER ROOM, SHOWING SWITCHBOARD AND ROTARY CONVERTER

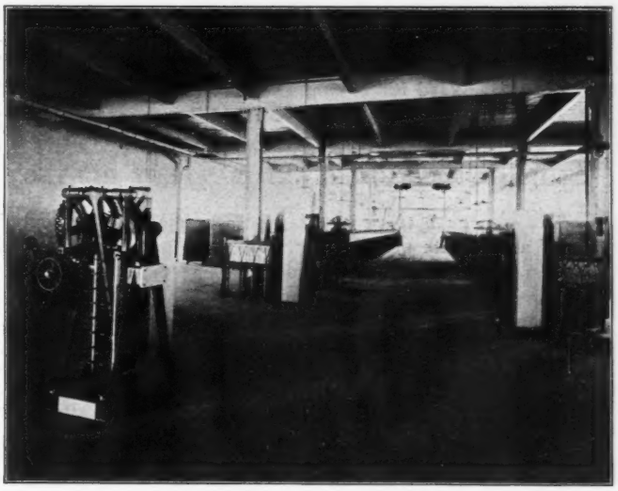
cooking rooms, one at each end of the large building. Both rooms have the same equipment.

The private branch telephone exchange is located in the center of the main office floor. It is finished in white enamel with plate glass windows. The floor is elevated so that the operator has a clear view of all the offices, and is able to locate anyone without difficulty.

The switchboard is of the latest type, as furnished by the Bell Telephone Co., and supplies thirty phones throughout the plant. The telephone operator is also a telegraph operator, and a private wire is run into the telephone booth and the telegraphic business of the company is handled through this source.

All telephone and telegraph wires are run secretly in iron conduits. The battery for operating the telephone exchange is located in the battery room in the basement of the main building, and is charged from a motor generator, which consists of a 7.5-horsepower Holtzer Cabot, 30-volt generator direct connected to a 10-horsepower induction motor on a 25-cycle, 440-volt circuit.

In addition to charging the storage battery for the telephone service, this motor generator also charges a second storage battery, which is used for operating a system of gongs throughout the plant, and the door bells and other signal bells.



ELECTRICALLY DRIVEN SEALING MACHINES OPERATED FROM MOTORS MOUNTED ON CEILING BELOW USING SILENT CHAIN AND GEAR DRIVE

On the front of the telephone booth there are two annunciators, which are also connected to the second storage battery, and are connected to the various offices so that a messenger can be called from the telephone.

The wiring for the telephones and for the annunciators terminates in jacks at five different points in each office, and each desk phone is connected to any one of these jacks by a plug so that a desk can be moved or located in any part of the office without necessitating any change in wiring.

There are four fireproof wire towers in the main building, and two in Administration Building. The cable is lead covered and runs in vitrified conduit from riser to riser. These cables in the risers are attached to angle iron supports, so that the whole construction is absolutely fireproof. The upper board is the power board with four main leads going into the bottom, and two divided circuits coming out at the side at the top and going up on angle iron supports to the level of the ceiling where they are carried out and distributed to the different motors.

Beneath the power circuit is the small lighting panel with its two connections, and the numerous small coils leading out to the ceiling level where they fan out and are in turn distributed.

A sceptum is placed in each duct separating the high potential from the low potential side. The cables are not yet installed in the duct, but are on hand to lead to the special cooking apparatus, which is located on one of the upper floors. The current will be brought to this apparatus at 2,200 volts and then transformed down to 110 volts. The high potential leads are installed only in one end of the building at present. In dividing up the lighting circuits the different panel boxes were attached to the different phases so as to approximately equalize the lead. A panel box, for instance, is connected to phase A, while the adjoining one in the next room would be connected to B. The panel boxes are made of slate enclosed in an asbestos lined iron box finished in white enamel.

The large shredding machines are on the second floor of the main building. They are driven by two 40-horsepower Westinghouse, 25-cycle, 440-volt induction motors.

The silent chain drive is employed, and a cast iron sub-base is provided, upon which the autostarter is located. On one side of the cast iron base is to be found a circuit breaker to protect the motor. The sub-base is made hollow, and the wires enter it from beneath, and all connections are made inside. These connections are accessible from hand-hole plates on each side of the sub-base.

The shredding machines are the principal machines in the factory. On either side the shredding machines is located one of the evaporators in which the product is given its third and last cooking.

In the extreme end of the room, back of the glass partition, are located the large Ferris wheel ovens which are of brick, and are used for baking.

STORAGE BATTERIES AND BATTERY PLATES.

The storage battery is today an important and essential part of a complete power plant, and when properly installed its advantages appear in three distinct phases; first, mechanically as maintaining virtually uniform loads upon generating equipment, enabling engines to be operated at the point of highest efficiency; second, electrically as maintaining constant pressures over long lines, despite load fluctuations and also preventing losses due to carrying large volumes of current over limited conductors; and third, financially as a result of gains as mentioned above, showing a smaller investment and lower cost of kilowatt output.

Batteries for general power service are of three types: the regulating battery, the floating or line battery, as used chiefly on street railway lines, and the boosted line battery. The regulating battery is always installed in connection with a booster through which all current flows, both in charge and discharge. The essential function of the booster battery is to neutralize fluctuations, charging when the current demand is light, discharging when the current demand increases above a predetermined point, thus maintaining a practically uniform load upon the generating equipment. During hours of very light load the engines may be entirely shut down and the battery furnish all power required. The line or floating battery has no booster or other charging equipment. It is simply connected across the circuit at points distant from the power house where the pressure drop under fluctuations is considerable. When the current demand is light, the e. m. f. of the line exceeds that of the battery and the current is absorbed. When the current demand causes the line pressure to drop below the e. m. f. of the battery, discharge takes place, so that voltage fluctuations are minimized. The boosted line battery as used on long lines entails the erection of a separate feeder line direct to the battery, the voltage of which is raised by a booster in the power station to any necessary extent above the line voltage to compensate for drop. This provides one auxiliary service of supply to the battery.

There are two distinct economies in line batteries: first, the savings on cost per kilowatt delivered, due to the elimination of large voltage losses on a given amount of current transmitted, and second, the smaller investment in copper conductors required to transmit the extreme ampere demand within the limits of allowable voltage drop. It is a fact too little appreciated that the first cost of a line battery is often very much less than of copper feeders sufficient to secure anything like equivalent effect. As evidence of the extent of these economies, it may be stated that the line batteries installed by the Gould Storage Battery Co. have frequently saved their entire cost in less than 18 months.

The battery is the controlling factor determining the efficiency, capacity, endurance and life of any storage battery. The requirements of lead storage battery plates, as given by Lamar Lyndon, M. E.. in "Storage Battery Engineering," are substantially as follows:

1. Uniform resistance throughout grid to secure even current flow through, are portions of active material.
2. Allowance for expansion and contraction of active material during discharge and charge.
3. Close electrical contact between active material and support plate.
4. Freedom from local or secondary action.
5. Provision for ample circulation of acid electrolyte.
6. Large surface of active material exposed to electrolyte.

The following brief description of the Gould battery plate and the accompanying illustrations serve to explain to how great a degree this plate fulfills the theoretical requirements as set forth above:

The Gould plate is of the Plante type, so-called, in which the active material—lead peroxide (p b O2) of the positive and spongy lead (P b) of the negative is formed electrochemically out of the lead composing the support plate or contact surface.

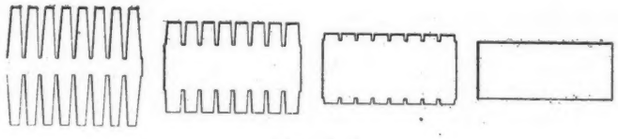


FIG. 1.

Fig. 1 is a fragment of a Gould plate illustrating the manner in which the large contact surface for active material is developed out of a sheet of rolled lead cut to the size and shape of the plate. This "blank" is placed between two shafts on which are mounted sets of rapidly revolving steel discs with spacing washers. These discs are pressed against the plate and moved to and fro, working into the lead further and further and spinning the metal between the knives up into thin parallel ribs.

FIG. 2.

Fig. 2 is a longitudinal section of a fragment of a plate, and shows the web of metal left as a central conductor and also the diamond-shaped cross conductors and current distributing bars.

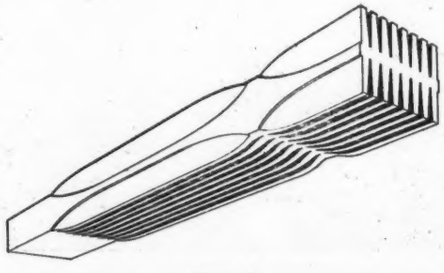


FIG. 3.

Fig. 3 is a perspective drawing of a small fragment of finished plate and very clearly indicates the character of the construction. The active material is formed out of the lead composing the contact surface between the ribs, filling the spaces with closely packed but highly porous active material. Expansion and contraction cannot cause loosening or falling out of the active elements, and the closest electrical contact is preserved.

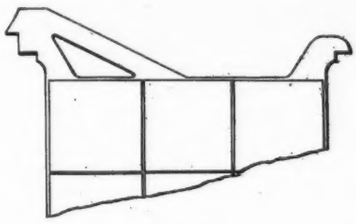


FIG. 4

Fig. 4 shows the double conducting lug, by means of which better distribution of current is secured.

Only chemically pure, densely rolled lead is used, so that secondary actions leading to "self-discharge" are therefore impossible. The Gould plate is absolutely integral; no lead is removed or added in making the plate, the blank being merely changed in form. The ample provision for circulation of electrolyte and the large contact surface presented secure high efficiency and long life.

In addition to batteries for power purposes, the Gould Co. is manufacturing types for telephone, telegraph and signal service, for train lighting and electric vehicles.

THE DEVELOPMENT OF WATER POWER IN SWEDEN FOR ELECTRICAL PURPOSES.

The electric industry owes much to Swedish ingenuity and discoveries. But if Sweden has hitherto largely provided other countries with means wherewith to facilitate the application of electricity to general industry, she evidently does not intend to let pass the opportunity of extending the use of electricity to the development of her own industries. The immense waterfalls which she possesses can develop sufficient electrical power to make ample amends for the scarcity of coal. The organization during 1905 of the Sydsvenska Elektriska Aktiebolaget (the South of Sweden Electric Company, Limited), is an event of considerable importance to industry. In reviewing the trade of Gothenburg district for the year 1905, the British consul reports that this company has been formed with a view of buying the waterfalls of the River Lagan, and from these to supply power and lighting not only to the town of Halmstad, where the headquarters of the company are situated, but also to Helsingborg, Landscrona, Malmo, and other places. The community of Halmstad owns an extensive tract of land adjoining the harbor, and naturally anticipates great advantage from being able to obtain electric power at a low rate for present industrial enterprises and such as undoubtedly will spring up in the immediate future. This company intends to improve the falls so that they may furnish about 14,000 horsepower, and later on to introduce further improvements so as to obtain a considerably greater amount of power or about 30,000 horsepower, and it is intended to supply this power so cheap as to exclude competition from any other source of power at present available. It is satisfactory to know that this can be done. There is, however, another question which has to be considered, and one that finds an answer in the law of supply and demand. It is not altogether unlikely that when arrangements have been made for the supply of this great quantity of current a full demand will not be forthcoming, as Sweden is neither a great manufacturing or industrial country, nor one in which great strides in this direction are likely to be made. Unless, therefore, the companies attract new industries such as are now grouped round Niagara, and which require large quantities of electric power, they are likely to be considerably handicapped. In any case, they will find it an easier matter to provide the current than to dispose of it in a country in which the present demand is limited.

ACCIDENTS CAUSED BY ELECTRICITY IN SWITZERLAND.

The Lugano correspondent of the "Times" Engineering Supplement says: "The annual return for last year shows that throughout the whole of Switzerland there were thirty cases of accidents by electricity, of which twenty-one were fatal. Among the victims seven belonged to the staff directly engaged in this branch, sixteen to those employed in other departments of the works, while seven were strangers. The workmen immediately concerned with the electrical apparatus suffered most severely, and the statistics indicate that the majority of the accidents were due to the extreme carelessness of these workpeople and to the neglect of the stringent regulations enforced on their behalf. No less than 62 per cent of the cases were caused by imprudence and want of caution. What took place in respect of two of the strangers would appear to show that the directions concerning the mode of averting injuries by fallen wires are not yet sufficiently known to the public. People are too liable to forget that the mere approach to a cable conveying a high-tension current which has fallen to the ground is dangerous. Six accidents (21 per cent) were caused by low-tension currents, not exceeding 250 volts; three (11 per cent) by medium currents, from 250 to 1,000; while 20 accidents (68 per cent) were due to high-tension currents exceeding 1,000 volts. The fact that a very feeble pressure may occasion severe injuries is shown by the loss of a life owing to a current of 2 amperes at 120 volts, while at the opposite extreme a man survived a shock caused by a current with a tension of 20,000 volts."—"Electrical Review."

ELECTRIC HEATING ON SHIPBOARD.

The facility with which the electric current can be utilized for heating purposes on shipboard is beginning to be recognized, and on all the best known shipping lines the rooms are warmed by electric heaters, while on H. M. warships, cross-channel and other passenger vessels, electricity is used in place of, or auxiliary to, steam or other heating systems.

When we consider the compactness, reduced weight, cleanliness, convenience, and safety of electric heating, it is easily understood why this method of heating is so desirable.

Natural gas in West Virginia is now becoming so common a commodity that the Mannington Gas Company finds that it has a daily surplus of 50,000,000 cubic feet, which it will utilize in the manufacture of carbon and lampblack. A plant covering four acres with a daily capacity of 125 barrels will be built at Downs.

A 12-horsepower four-cylindered petrol motor in America recently ran eighty-seven miles on two gallons of petrol. The weight of the car was 1,500 pounds. Another car identically the same only ran fifty-seven miles on the same allowance of fuel.—"Scientific American."

Oakland, Cal.—Assurances of an early lighting of Broadway and Washington streets have resulted from a conference between Mayor Mott and F. H. Dahn, to whom the contract has been awarded. Lights will extend on Washington and Broadway from Seventh to Fourteenth street and on Twelfth street from Jefferson to the Boulevard. There will be 65 lights, the city furnishing the power.

Fourteenth Annual Convention of the Pacific Coast Gas Association

Continued from Page 261

MINUTES OF THE FOURTEENTH ANNUAL MEETING

of the

PACIFIC COAST GAS ASSOCIATION,

Held On

September 18th, 19th and 20th, 1906.

The fourteenth annual meeting of the Pacific Coast Gas Association was called to order at 10:40 a. m., Tuesday, September 18th, 1906, by Vice-President C. O. G. Miller.

On motion duly seconded, the formal roll call was held, the following members being present:

ACTIVE.

H. E. Adams
John A. Britton
E. F. Cheffins
John Clements
C. W. Conlisk
D. W. Campbell
Wm. Duval
Christian Froelich
W. W. Gillespie
J. E. Green
Chas. P. Grimwood
Sherwood Grover
C. M. Guenther
W. T. Gunder
Geo. C. Holberton
Geo. H. Hollidge
R. M. Hotaling
Chas. Hughes
E. C. Jones
C. H. Pennoyer
E. C. Randall
R. H. Sterling
R. J. Thompson
F. Varney
J. E. Aue
J. P. Coghlan
J. W. Finn
Will Henderson
John H. Hunt
F. V. T. Lee
L. E. Reynolds
F. A. Reynolds
R. E. G. Keene
Benj. F. Pearson
H. A. Burns
A. C. Beck
H. O. Byerly
O. E. Clark
W. B. Cline
Geo. A. Campbell
Walter S. Dole
Frank Foveaux
W. H. Foster
E. S. Jones
F. C. Jones
Philo Jones
John S. Kaneen
H. F. Keyes
G. I. Kinney
Geo. Kirk
F. A. Leach, Jr.
A. J. Lloyd
Geo. P. Low
L. P. Lowe
J. E. Poingdestre
E. A. Rix
Geo. Thompson
R. P. Valentine
H. Weber
H. Bostwick
A. C. Corsen
E. W. Florence
H. B. Heryford
Wm. E. Jason
Thos. J. Maynard
J. A. Vernon
J. E. Parmalee
L. M. Jensen
Jos. M. Berkley
John D. Kuster
W. F. Boardman
A. Carrigan
R. L. Clark
Geo. S. Colquhoun
Clarence Cope
D. O. Druffel
F. E. Fitzpatrick
John M. Gardiner
S. C. Lowe
Henry Malloch
C. O. G. Miller
F. F. Minaker
S. L. Naphthaly
L. H. Newbert
M. C. Osborn
W. E. Osborn
E. F. Oswald
T. R. Parker
B. S. Pedersen
P. W. Prutzman
John T. Scott
J. R. Thompson
A. J. Vanderwhite
John Werry
Van E. Britton
J. P. Davidson
S. P. Hamilton
E. C. Holdeman
L. H. Johnson
A. J. Oswald
Richard C. Malone
F. W. Johnson
W. D. Kohlwey
Jno. T. Davis

ASSOCIATE.

California Light and Fuel Company, San Francisco, Cal.
Chico Gas and Electric Company, Chico, Cal.
Colusa Gas and Electric Company, Colusa, Cal.
General Gas Light Company, Kalamazoo, Mich.
Nevada County Gas and Electric Company, Grass Valley, Cal.
Holophane Glass Company, New York, N. Y.
Long Beach Gas Company, Long Beach, Cal.
H. Mueller Mfg. Company, Decatur, Ill.
Nevada County Gas and Electric Company, Nevada City, Cal
Palo Alto Gas Company, Palo Alto, Cal.
Petaluma Gas and Electric Company, Petaluma, Cal.
Riverside Light and Fuel Company, Riverside, Cal.
Sacramento Electric, Gas and Railway Co., Sacramento, Cal
San Francisco Gas and Electric Company, San Francisco, Cal.
San Rafael Gas and Electric Light Company, San Rafael, Cal
Stockton Gas and Electric Company, Stockton, Cal.
Suburban Electric Light Company, San Leandro, Cal.
The Schneider & Trenkamp Company, Cleveland, Ohio.
The Standard Lighting Company, Cleveland, Ohio.
The Standard Meter Company, Philadelphia, Pa.
The W. F. Boardman Company, San Francisco, Cal.
Town of Santa Clara, Santa Clara, Cal.
United Gas and Electric Company, San Jose, Cal.
Watsonville Light and Power Company, Watsonville, Cal.
Woodland Gas and Electric Company, Woodland, Cal.
Journal of Electricity, Power and Gas, San Francisco, Cal.
The Edison Electric Company, Los Angeles, Cal.
S. J. Kenworthy, Pacific Stove Company, Oakland, Cal.
Western Mantle Company, Portland, Ore.

HONORARY.

F. H. Eichbaum.

On motion of Mr. Britton, the reading of the minutes of the last meeting was dispensed with.

The following telegrams were read by the Secretary:

"Pacific Coast Gas Association, San Francisco, Cal.,

"Thrice happy would I be to take flight and be with you during your deliberations and outing. May the fourteenth annual meeting ever be remembered as the most profitable in our history is the earnest wish of your absent President.

"JNO. MARTIN."

"John A. Britton, Secretary.,

"My congratulations to the Association on its record breaking meeting. Our Coast of magnificent distance prevents my attendance.

"C. R. COLLINS."

The report of the Secretary and Treasurer was then read to the Association:

REPORT OF SECRETARY AND TREASURER.

As all records of the Association were destroyed by the conflagration in San Francisco on April 18, 1906, it was necessary to open up new accounts, and on May 31, 1906, we had a cash balance of $1,057.83 to our credit in the Mercantile Trust Co., of San Francisco, and vouchers aggregating $195.40—total, $1,253.23. Of this amount, $318.79 was placed to credit of Library Fund, being $68.79 on hand July 1, 1905, and $250.00 donation to fund by Messrs. Jones, Martin, Lowe, Boardman, and Britton, and balance, $934.44, placed to credit of General Fund.

September 15, 1906.

General Fund	$934.44	
Library Fund	318.79	
		$1,253.23
Dues, 1906-7		110.00
Initiation Fees		65.00
Bank Interest		3.68
Fire Insurance, account Library		990.00
Donation to Library Fund, W. F. Boardman		100.00
		$2,521.91

Contra.

Account 13th Annual Convention	$ 122.20	
Library purchase of books, etc	104.40	
Expenses, Secretary's office, postage and stationery	67.28	
Cash on hand	95.00	
Cash in bank	2,133.03	
		$2,521.91

September 15, 1906.

General Fund	$ 923.64
Library Fund	1,304.49
Total cash on hand	$2,228.03

Resignations.

1. H. S. Wanzer, Santa Cruz, July, 1904.

Deaths.

1. James McNeill.
2. Samuel Guthrie.

List of Papers to be Read at 14th Annual Meeting.

1. Should Gas Companies Engage in the Sale of Gas Appliances? ... W. B. Cline
2. Best Methods of Promoting Gas Sales ... S. P. Hamilton
3. The Story of the Restoration of the Gas Supply in San Francisco, after the Fire ... E. C. Jones
4. How Electricity was Served to Consumers and Street Car Lines by the San Francisco Gas and Electric Company after the Fire ... L. E. Reynolds
5. Personal Experiences with Municipal Gas Plants ... C. E. Moore
6. The Equity of Sliding Scale Gas Rate ... F. A. Leach, Jr.
7. Experience with High Pressure Gas Mains ... Sherwood Grover
8. Utilization of Gas Engines for Power Purposes ... J. E. Aue
9. Some Economics in High Pressure Gas Transmission ... E. A. Rix
10. The Art of Canvassing ... John Clements
11. The Gas Institute ... F. H. Shelton
12. Novelty Editor ... G. H. Hollidge
13. Wrinkle Editor ... Geo. S. Colquhoun
14. Experience Editor ... R. P. Valentine
15. Historian ... Geo. P. Low

Membership.

July 1, 1905.

On books, regular members	156	
On books, associate members	25	181
Elected, Meeting July 18, 1905.		
Regular	40	
Associate	41	81
		262
Resigned	1	
Died	2	3
		259

Pins.

Twelve or fourteen destroyed by fire; none on hand.

List of Applications for Membership.

REGULAR.

1. J. E. Aue,
   Engineer, Snow Steam Pump Works,
   Buffalo, New York.
2. C. M. Baker,
   Manager Pasadena Consolidated Gas Co.,
   Pasadena, Cal.
3. A. C. Balch,
   Manager Pacific Light & Power Co.,
   Los Angeles, Cal.
4. Henry Bostwick,
   Secretary to the President,
   Pacific Gas & Electric Company,
   San Francisco, Cal.
5. Van E. Britton,
   Manager Santa Cruz Gas & Electric Company,
   Santa Cruz, Cal.
6. John P. Coghlan,
   Claims Agent, Pacific Gas & Electric Co.,
   San Francisco, Cal.
7. A. C. Corsen,
   Superintendent Pasadena Consolidated Gas Co.,
   Pasadena, Cal.
8. J. P. Davidson,
   Agent Humphrey Gas Arcs,
   San Francisco, Cal.
9. J. W. Finn,
   Superintendent Gas Contract Department,
   San Francisco Gas & Electric Co.,
   San Francisco, Cal.
10. Edward W. Florence,
    Manager Chico Gas & Electric Co.,
    Chico, Cal.
11. S. P. Hamilton,
    Manager Gas Stove, Co.,
    San Francisco Gas & Electric Co.,
    San Francisco, Cal.
12. Will Henderson,
    Care Sacramento Electric, Gas & Railway Co.,
    Sacramento, Cal.
13. H. H. Heryford,
    Manager Colusa Gas & Electric Co.,
    Colusa, Cal.
14. E. C. Holdeman,
    Manager Crane Co.
15. Jno. H. Hunt,
    Purchasing Agent Pacific Gas & Electric Co.,
    San Francisco, Cal.
16. Wm. E. Hason,
    Manufacturer's Agent Gas Stoves,
    3827 California street, San Francisco, Cal.
17. L. H. Johnson,
    Superintendent San Francisco Coke & Gas Co.,
    San Francisco, Cal.
18. J. J. Kelly,
    Superintendent Distribution, Gas Department,
    San Francisco Gas & Electric Co.,
    San Francisco, Cal.
19. F. V. T. Lee,
    Assistant to the President Pacific Gas & Electric Co.,
    San Francisco, Cal.
20. S. J. Lisberger,
    Care Pacific Gas & Electric Co.,
    San Francisco, Cal.
21. C. A. Luckenbach,
    Manager Construction,
    Los Angeles Gas & Electric Co.,
    Los Angeles, Cal.
22. Chas. G. Lyman,
    Manager and Secretary San Francisco Coke & Gas Co.
    San Francisco, Cal.
23. Thomas J. Maynard,
    Foreman San Francisco Gas & Electric Co.,
    San Francisco, Cal.
24. F. C. Millard,
    Inspector of Operation,
    Los Angeles Gas & Electric Co.,
    Los Angeles, Cal.
25. A. J. Oswald,
    Gas Maker, Municipal Gas Plant,
    Santa Clara, Cal.

26. L. E. Reynolds,
Superintendent Construction, Electric Department,
San Francisco Gas & Electric Co.,
San Francisco, Cal.

27. Robert W. Shingle,
Director Honolulu Gas Co.,
Honolulu, H. I.

28. Chas. R. Thorburn,
Agent Economy Gas Ranges,
Union Savings Bank Building,
Oakland, Cal.

29. H. A. Van Norman,
Inspector of Construction,
Los Angeles Gas & Electric Co.,
Los Angeles, Cal.

30. C. S. Vance,
Manager of Operation,
Los Angeles Gas & Electric Co.,
Los Angeles, Cal.

31. J. A. Vernon,
Superintendent of Plant, Municipal Gas Plant,
Santa Clara, Cal.

32. Richard C. Malone,
Foreman San Francisco Gas & Electric Co.,
San Francisco, Cal.

33. F. A. Reynolds,
Gas Maker, Monterey Gas & Electric Co.,
Monterey, Cal.

34. Jno. T. Davis,
Chemist,
1403 Grove street, Oakland, Cal.

35. L. M. Jensen,
600 Seventh street,
San Francisco, Cal.

36. H. A. Burns,
Manager Nevada Gas Co.,
Tonopah, Nevada.

37. Jos. M. Berkley,
Superintendent Gas Department,
Edison Electric Co
Los Angeles, Cal.

38. Benj. F. Pearson,
General Superintendent,
Edison Electric Co.,
Los Angeles, Cal.

39. J. E. Parmalee,
Gas Appliances,
3125 California street,
San Francisco, Cal.

40. F. W. Johnson,
Gas Appliances,
3125 California street,
San Francisco, Cal.

41. W. D. Kohlwey,
Gas Appliances,
2107 Sutter street,
San Francisco, Cal.

42. R. E. G. Keene,
Manufacturers' Appliances,
Sixteenth and Carolina streets,
San Francisco, Cal.

43. John D. Kuster,
Manager Fresno Gas & Electric Light Co.,
Fresno, Cal.

ASSOCIATE.

1. Z. T. Bell,
Manager Home Gas & Lighting Co.,
San Bernardino, Cal.

2. Journal of Electricity, Power & Gas,
Atlas Building,
San Francisco, Cal.

3. The Edison Electric Co.,
Los Angeles, Cal.

4. A. J. Provost,
Manufacturer Mantles,
507 Sixteenth street,
Oakland, Cal.

5. Phoenix Glass Co.,
15 Murray street,
New York N. Y.

6. S. J. Kenworthy,
Pacific Stove Co.,
Twenty-second and Grove streets,
Oakland, Cal.

7. Western Mantle Co.,
28 Front street,
Portland, Or.

8. Tacoma Gas & Electric Light Co.,
Tacoma, Wash.

JOHN A. BRITTON, Secretary.

The report of the Board of Directors was then read by the Secretary:

San Francisco, Sept. 17, 1906.

To the Pacific Coast Gas Association:

Your Board of Directors beg to advise that they have examined the report of the Secretary and Treasurer, and the vouchers attached thereto, in connection with the payments of bills, and find the same to be correct, and the true balance on hand in the general and library funds to be as reported in said statement of the Secretary and Treasurer.

They also approve for election to membership the names of applicants as listed in the said report of the Secretary and Treasurer, all of which is respectfully submitted.

JOHN A. BRITTON, Secretary.

REPORT OF THE LIBRARIAN OF THE PACIFIC COAST GAS ASSOCIATION.

The President and Members of the Pacific Coast Gas Association:

Gentlemen—Your Librarian begs to render to you the following report on the condition of your library:

By reference to the printed catalogue, published in July, 1905, you will note that the Association was in possession of a fine collection of books, covering all branches of our industry. After this catalogue was issued there were many new books acquired, and the library was growing in popularity among the members.

At the time of the fire, April 18th, the books and their cases were housed in the office at the Shreve building, and with the exception of about thirty-five books out of the library at the time of the fire, it was totally destroyed on Thursday, April 19th.

Had it not been for the kind thoughtfulness of a dear friend the loss of the Association Library would have been total, but Mr. Jose Costa presented our Association with a policy for one thousand dollars, insuring our books against fire, and through the kind assistance of Mr. Costa your Association received nine hundred and ninety dollars in cash in payment of this policy.

The settlement of the insurance on the library was a subject of a special meeting of the Board of Directors, held June 8, 1906, the minutes of which are as follows:

San Francisco, June 8, 1906.

A special meeting of the Board of Directors of the Pacific Coast Gas Association was held this day at 11 a. m., at the office of the San Francisco Gas & Electric Co., 925 Franklin street, San Francisco, Mr. Jno. Martin, President, in the chair.

On motion, Mr. R. H. Sterling was elected Secretary pro tem. The President stated that the meeting was called for the special purpose of passing a resolution giving authority to adjust fire claims, owing to the destruction of the Association Library by fire.

The following resolution, offered by Mr. W. F. Boardman, duly seconded by Mr. R. H. Sterling, was unanimously adopted:

Resolved, That E. C. Jones shall be, and he is hereby authorized and empowered to act as the agent of the Pacific Coast Gas Association in the adjustment of any and all claims which have arisen or which may arise against any and all of the fire insurance companies in interest by reason of the fire of April 18, 1906, and that said E. C. Jones has full power and authority to adjust and settle said claims, or any or all of them, and to make, execute and deliver all documents and papers which may be required in the course of such adjustments, settlements or compromises, or any of them; to receive and discharge for all moneys which may become due or payable to the Pacific Coast Gas Association in respect of such claims, or the adjustment, settlement or compromise thereof, and to do everything necessary and proper to represent the Pacific Coast Gas Association in the premises, exactly as though it were acting itself.

I hereby certify that the above is a full, true and correct copy of a resolution unanimously adopted at a special meeting of the Directors of the Pacific Coast Gas Association duly called and convened on the 8th day of June, 1906, and that the same has not been altered or revoked, and is now in full force and effect. JNO. MARTIN, President.

The Librarian was called upon for a statement of the loss of the library, and reported as follows:

"The number of books contained in the library of the Pacific Coast Gas Association was about 1,000, and their value amounted to $4,000. These were all technical books, relating to gas and its by-products, electricity, and the different journals, some of which were bound semi-annually, while the less voluminous journals were bound annually.

"There were about 35 books out of the library at the time of the fire. These were valued at $100.

"The value of the books averaged from $2.50 to $60, and very few were less than $2.50. E. C. JONES,

"Librarian Pacific Coast Gas Association."

Mr. W. F. Boardman presented his personal check for $100 to the library fund of the Association, and on motion, the thanks of the Board of Directors was tendered to Mr. Boardman.

On motion, duly seconded, Mr. E. C. Jones, the Librarian, was authorized to expend such moneys as are contained in the library fund, and any addition thereto owing to the payment of insurance, for the purchase of new books as a nucleus for a library.

On motion, it was voted to adjourn.

R. H. STERLING, Secretary pro tem.

The library fund available for the purchase of books now amounts to $1,304.39. The Western Gas Association, through their Secretary, donated to our library six bound volumes of their Proceedings, and Mr. John A. Britton donated seventeen volumes of the Annual Report of the Board of Electric Light Commissioners of Massachusetts.

Since the destruction of the library, a well-bound set of King's Treatise, in three volumes, has been purchased, as well as the standard Engineer's Pocket Books. With these and the few books that were in the hands of the members as a nucleus, and the balance of cash on hand, we should be able to procure enough books to start the library well on its way toward future usefulness.

The success of the library is well assured, and your Librarian does not hesitate to recommend the purchase of the best available books on the gas business and kindred subjects.

Your Librarian recommends a resolution of thanks to Mr. Jose Costa as an acknowledgment of his kindness.

Respectfully submitted,

E. C. JONES, Librarian.

Mr. L. P. Lowe, Chairman of the Committee on Gas Engineers' Degree, reported that owing to the incidents of April 18th, no opportunity had been given to take up the matter, and requested that, the matter being a highly important one, the committee be continued to further that work.

Mr. L. P. Lowe, Chairman of the Committee on Permanent Home, reported that while the matter was to have been taken up along the line of club rooms, in the hope that permanent headquarters might be established in San Francisco, yet, owing to the incidents of April 18th, no time had been given to the matter. A continuance of the committee was recommended.

RESOLUTION.

Whereas, The Committee on Library has reported to this Association of the very timely and generous gift of Jose Costa of a full paid up policy in the sum of $1,000 upon the library of the Association; now, therefore, be it

Resolved, That this Association tender to Mr. Jose Costa its heartiest thanks for his donation, by which the Association has been enabled to realize the sum of $990 for the rehabilitation of the library destroyed by fire on April 19, 1906. And be it further

Resolved, That a copy of this resolution be forwarded to Mr. Jose Costa.

MISCELLANEOUS BUSINESS.

Secretary: I am authorized on behalf of Mr. L. P. Lowe to announce that he will, if it suits the pleasure of the Association, donate to it reproductions of the portraits of all Past Presidents which were destroyed in the fire. I move you, therefore, that the offer of Mr. Lowe be accepted by the Association with thanks. (Carried.)

Mr. Pearson: I desire, on behalf of the Los Angeles Gas & Electric Co., to state that that company will donate, if it suits the pleasure of the convention, the sum of $100 toward the library fund.

On motion of Mr. Britton, the amount was accepted by the Association, and a vote of thanks extended to the Los Angeles Gas & Electric Co.

Mr. Lowe: Permit me to donate to the Association, for the purpose of housing the library, a set of sectional bookcases.

On motion of Mr. Jones, the offer of Mr. Lowe was accepted, and a vote of thanks tendered to him for his kindness.

Secretary: I have in my hands for presentation to the Association, a memoriam prepared by Mr. E. C. Jones, to the deceased members of the Association, which I will read with your permission.

IN MEMORIAM.

James McNeil.

James McNeil, one of our oldest members, died at his home in Santa Cruz, April 1, 1906.

Mr. McNeil was born in Scotland in 1837, and was therefore 69 years old at the time of his death.

He went to Canada with his parents and five of the children in 1851, but moved to New York eight years later to follow the business of boiler-making. In 1864, possessed by the desire to see the west, he came to San Francisco, and became foreman of the Vulcan Iron Works. He remained there a year, and was always honored and respected by employer and employed.

In 1867 he and his brother started the now world-renowned firm of Jas. McNeil & Bros., and after several trips to Europe, he visited California in 1890, selecting Santa Cruz as a permanent home. His splendid residence in Santa Cruz was known among our members as a center of most generous hospitality.

The deceased was a prominent Mason, being Past Commander of Escalon Commandery, Knights Templar, in Pittsburg, and also a member of Syria Temple of the Mystic Shrine in Pittsburg. He was also enrolled in membership in the Santa Cruz Lodge of Elks.

Mr. McNeil was interested in the electric light and gas business in Santa Cruz, and greatly improved the old gas plant, which he took over in 1890.

He was one of the early members of the Pacific Coast Gas Association, having joined at the second annual meeting, held in Sacramento in 1894.

Our brother was well beloved by all who knew him, was generous and kind-hearted, and contributed much to the success of our Association by his genial presence at our meetings.

The loss of our brother is mourned by his widow, who survives him.

IN MEMORIAM.

Samuel Guthrie.

Samuel Guthrie was born in Chicago, Ill., in the year 1829. As a boy he worked in the waterworks at Chicago, and later was engineer on one of the Mississippi steamboats. He followed this business until he was 21, when he attended Yale College for two years, and afterward matriculated at the Harvard Law School with the intention to eventually practice law, but did not complete the course, and went to Mexico to engage in the mining business.

He returned to California in 1855, and worked for the Southern Pacific Railroad Co. as a machinist, and in 1882 was employed by the Pacific Gas Improvement Co. of San Francisco, first as machinist and then as foreman of their works, a position which he held until the gas consolidation in San Francisco some four years ago.

Mr. Guthrie was a member of Presidio Lodge of Odd Fellows, and was one of the charter members of the Pacific Coast Gas Association, having signed the roll number twenty.

He was married to a most estimable wife, who died in 1889, leaving no children.

Mr. Guthrie died at Thermalito, Cal., February 27, 1906, and was buried at that place. He was a great sufferer during the later years of his life, but faced the end with courage and fortitude. His taking away from our number is deeply regretted by many friends and associates.

IN MEMORIAM.

William Dunbar.

William Dunbar died at Wailuku, on the Island of Maui, Hawaiian Islands, in March, 1906.

Mr. Dunbar for many years was one of the leading contracting masons in San Francisco, and the best efforts of his life were devoted to the brick and terra cotta work of the North Beach Station of the San Francisco Gas Light Co., beginning in 1891 and extending through 1893, the year which saw the birth of the Pacific Coast Gas Association.

The North Beach gas works was his pride, and many of our members will remember the first outing of our Association, which included an inspection of that fine gas works.

Mr. Dunbar was one of the charter members of the Association, having signed the roll number 32.

After the completion of his work in San Francisco he removed his home to Honolulu, where he was actively engaged in mason work until the time of his death.

Our departed brother and friend will always be remembered for his kind heart, generosity and good nature.

Mr. Dunbar was a Free Mason, having been a member of the Blue Lodge and Royal Arch Chapter.

The deceased is survived by a widow, who resides in the Hawaiian Islands.

Although Mr. Dunbar was not a member of our Association at the time of his death, it is fitting that we should pay tribute to his memory.

On motion of Mr. Britton, the memoriams were accepted and ordered placed upon the minutes of the Association.

The President's address was then read by the Secretary:

Published in Issue of September 29th

Acting President Miller: We have listened with interest to the address of our President, Mr. Martin, and I take pleasure in appointing as a Committee on President's Address Messrs. F. H. Eichbaum, R. H. Sterling and B. S. Pedersen.

Secretary: With reference to the Experience Department, and in connection with the Spangenberg meter, which, you will remember, was discussed at our last meeting, and at which time a short paper was read by Mr. E. C. Jones, I have in reply to inquiries made to Eastern manufacturers the following:

Philadelphia, September 12, 1906.

Mr. John A. Britton, Secretary Pacific Coast Gas Association, San Francisco, Cal.:

Dear Sir—In reply to your inquiry regarding the working of the "A" meter, there is but little that can be said, as the meter is just now in the experimental stage. We are, however, enclosing you a report which we think covers all that can be said at present.

Thanking you for your courteous thought in the matter, and wishing you abundant success for the coming convention, we are, yours truly,

JOHN J. GRIFFIN & CO.

The "A" meter has, up to this writing, substantiated the claims of its advocates. All the test reports we have seen show these meters to prove about as well as the standard meters. They have not, however, been in use long enough to demonstrate what their showing will be after extended use. The subject has been so thoroughly discussed and all the prophecies so clearly made that there is nothing lacking but the completion of the practical trial now under way. There are in use about ten thousand of "A" meters. They promsie success.

JOHN J. GRIFFIN & CO.

Philadelphia, September 5, 1906.

Mr. John A. Britton, Secretary Pacific Coast Gas Association, San Francisco, Cal.:

Dear Sir—Your favor of August 25th has been duly received. In reference to the Spangenberg or large capacity gas meter, also known as the A type of meter, we beg to say that we should be very glad to supply you with a paper on the subject but for the fact that hardly sufficient data is obtainable for the writing of a regular paper.

This meter has been in use now but a little over a year and sufficient time has not elapsed to indicate with certainty its performance. We have made several thousand of these meters, and we have practically had no complaint from them, the bulk of the meters having been in use for about a year.

It is but fair, however, to mention that most of these meters have been measuring natural gas, which is an ideal condition as far as the meter is concerned, owing to the absence of condensation, etc., and the presence, usually, of a slight trace of oil vapor. The meters, however, which have been used for artificial gas have behaved so far as well as the others.

The conclusion to be adopted at this time, in our judgment, is that the A type of meter has met the expectations of its advocates so far, but no positive report can be issued

until the meters have been in use for a few years longer and when all conditions have been encountered.

The particular query to be made is as to the effect of the additional wear imposed upon the meter and the resulting effect upon registration. As gas meters have had, and it is hoped will continue to have, long lives, this element is one which must be regarded in any estimate of value. It cannot be definitely settled until actually experienced.

We hope that the above will be of interest to you, and if there is any further information we can furnish we will be very glad to do so.

We trust that your meeting will be a most agreeable one, and we also hope that the effect of the recent disaster on your Coast will be forgotten in prosperous times to follow.

Very truly yours,

HELME & McILHENNY.

Acting President Miller: This Spangenberg meter was pretty thoroughly discussed at the last meeting of the Association, and I would now like to ask if any of the members have had any experience with the meters.

Mr. Lowe: I might briefly explain that the Spangenberg meter is nothing more or less than our present gas meter, but with some slight changes—interior changes. The ports are made very large, there is free passageway for the diaphragms, and they are intended to run at a high rate of speed. In the development of sizes, a great many of our present sizes are left out. The 3, 5 and 10-light meters are now embodied in one size. I think there are only five sizes of meters all together. They are of much greater capacity, somewhat larger in size and cost, and are supposed to overcome a great many of the difficulties which we have met with in our old meter. It is rather strange that some of the gas companies of the Coast have not tried them. They have been on the market now for about a year.

Acting President Miller: It seems that more should be said on this matter, but if not, we will pass to the reading of a paper by Mr. W. B. Cline, "Should Gas Companies Engage in the Sale of Gas Appliances?"

Published in Issue of September 22d

Acting President Miller: The paper presented by Mr. Cline has been a very interesting one. I would like to hear from Mr. S. P. Hamilton, manager of the gas stove department of the San Francisco Gas & Electric Co., on the subject.

Mr. Hamilton: We have tried both systems here, and have finally gone back to the system of the gas company selling appliances. However, our test has been hardly long enough to demonstrate whether the other system is a proper one or not.

Acting President Miller: Did the gas company stop selling gas appliances? I thought the company in San Francisco kept a gas appliance store.

Mr. Britton: That was abandoned on the first of July, 1906.

Mr. Lowe: I would like to ask Mr. Cline their method of handling gas appliances. Until a short time ago, I believe, you controlled the absolute sale of them?

Mr. Cline: Until about a year and a half ago.

Mr. Lowe: Do you still supervise the same in a general way?

Mr. Cline: Yes, in a general way, merely to see that it is properly handled, and that the prices are reasonable.

Mr. Lowe: What do you call a reasonable price?

Mr. Cline: We merely calculate what would be a reasonable profit, but the result is general in a way, as I spoke in my paper, that every stove dealer in town is boosting the gas appliance business.

Mr. Lowe: To what extent do you now have calls for repair work? Do the dealers call upon you in any way to rectify troubles?

Mr. Cline: No, sir. There are several concerns in town which attend to the repair work almost exclusively. If there is anything wrong with the stove the purchaser will first appeal to the concern from which it was purchased, and they will either attend to it or turn it over to the repair firms. It relieves us of an enormous amount of gratuitous work. The point is that every dealer in town is trying to sell his goods in preference to any other man engaged in the same business.

Mr. Lowe: Do you think, Mr. Cline, that a small company would operate with as much success in turning the sales of appliances over to the regular dealers as would a large company?

Mr. Cline: I think, Mr. Lowe, that if the small company got to the point where gas became the universal fuel it would be the same.

Mr. Lowe: The experience that I have had in small towns has been that, try as you may, you could not be very successful in having the dealers take hold of the proposition. My experience with dealers in small towns is that there seems to be a general antipathy toward the business.

Mr. Cline: I think that is brought about largely by the fact that the gas companies are, to a large extent, controlling the sale of gas appliances. One of the principal reasons why it is harder in a small town is that the price of gas is higher than in a large place.

Mr. Byerly: If the appliance company know that a stove is not giving satisfaction, and refuse to send a man out to repair it, then do you send a man?

Mr. Cline: No, sir. We send out a man to find out what is the fault with the stove, or appliance, and he tells the consumer to apply to the gas appliance or repair man. We never touch a stove unless it is some little thing. In Los Angeles, I will state, that fully 95 per cent of the consumers use gas for fuel.

Mr. Lowe: Then, in other words, you reach pretty nearly every consumer along your line?

Mr. Cline: About 95 per cent, at least.

Mr. Lowe: Do you mean that 95 per cent of those who use gas use it for fuel as well as for lighting, or 95 per cent of the houses along the line?

Mr. Cline: I referred to 95 per cent of the consumers, but I would state that nearly everyone along the line uses gas, which is very near the same thing.

Mr. Leach: I was particularly pleased when I saw this topic in the prospectus, but even more pleased now because about two years ago it seemed to me that Mr. Cline's views were the facts in the distance, and while we have not (the time is not ripe in my judgment for us in Oakland) withdrawn entirely from the field of gas appliances, I believe that we are working along the exact lines that Mr. Cline is doing, and I can see, from the results that we have obtained, that we are progressing properly, and that before very long the conditions will exist in Oakland, on the other side of the bay, that will warrant the gas company to withdraw entirely from the sale of appliances, and, as Mr. Cline says, save us a great deal of money and expense in the matter of making repairs and in running down complaints. The matter of cleaning stoves, and adjusting them, this certainly should be paid for, but the main thing, as Mr. Cline has emphasized in his paper, is that every dealer in household furnishings and every department store should handle gas appliances. Previously they have been, as Mr. Cline has said, antagonistic to the sale of gas stoves. If a party went in to buy the complete furnishings for a house they would sell them everything they wanted, but when they came to the fuel proposition, if they wanted a gas stove, they would discourage the idea and try to sell them anything else but a gas stove—a gasoline stove, a coal stove, or even an oil stove, explaining that they were cheaper and would give just as good satisfaction. We now have in Oakland at least 15 or 20 establishments with full lines of gas appliances, gas stoves from a one-hole burner to

large ranges are on display in all of these different stores, and when persons ask for a gas range they are not shunted, but they are shown the very best samples that the concern can sell, and while we have not made such large sales as Mr. Cline speaks of, at the same time the sale of gas stoves on our side of the bay is very satisfactory. We keep a very close record of the number of gas stoves connected with our lines, and also in the various territories, and check them up with the number that we sell ourselves, and find that we are selling less than 10 per cent of the stoves that are put in on the other side of the bay. As I said before, I do not consider that the time is ripe for us to withdraw entirely from the sale of gas appliances, but I do believe that all that it is necessary for us to do is to set the pace, maintaining a price that will allow the dealer a fair profit, and maintaining a price sufficiently high to protect him and keep up the standard of stoves. This can be done by maintaining a sample room and exhibiting the various designs, and I think that the best place for that sample room is at the counter, or as near as possible to the public vestibule where the gas consumers make their monthly payment of bills.

Mr. Pearson: It seems to me that one particular point that has been overlooked in this matter is the wholesale selling by retail dealers. After the market has been fairly well supplied, and there is not very much more business to be done by them, that is, where the field is occupied and the cream of the business has been taken off by the company. But what are we going to do with the inferior appliances that are put on the market and sold by department stores and dealers, irrespective of price or conditions? I agree with Mr. Cline, as far as the necessity of selling the stoves is concerned, in Los Angeles, but I do not agree that it would be so in small towns. I do not think that practice will prove it so. It would be dangerous for a small company in Southern California, at least, where municipal ownership and competition is so rife, to fail to offer to the people the best appliances possible, and to attend to their every want. I think sometimes that we lay too much stress upon the fact that we doing too much gratuitous work. I do not believe that any company is suffering from doing too much of this sort of gratuitous work. If they are, it must be due to the management; the management must need fixing. If a consumer has a complaint, and that complaint is not changed or altered by reason of the fact that you sold the appliance, the responsibility with the carrier seems to me to remain the same in the end, because the balance side of the ledger is the end that you are looking for.

Acting President Miller: Mr. Cline, as I understand you, you say that there is only 5 per cent of possible consumers in Los Angeles yet remaining to supply stoves to?

Mr. Cline: I did not mean that 95 per cent of the inhabitants were consumers of gas, but my remarks referred to 95 per cent of the gas consumers already on the books were using fuel gas.

Mr. Jones: It seemed to me, as I listened to the paper, that Mr. Cline did not intend to convey the idea that the occupancy of the field was complete, but that he was trying to demonstrate the necessity of gas stoves, and that it was the best possible means of cooking. I think he means that you must first supply the consumers with the knowledge of the proper use and economy of gas.

Mr. Cline: Yes, that is the result of 17 years' efforts, Mr. Jones, and we are at last arriving at the point where it may be realized.

Mr. Clement: I agree with Mr. Cline. He has reached a place where it is no longer necessary for the company to do this work of installing these stoves—it is no longer necessary for them to transact this part of the business. He gives the work, the labor, and the selling of these stoves to outside parties, and by that means gains their friendship, which is a great advantage to the company. In the small towns some years ago the gas manager was confronted with the electric light, which took away, in some instances, one-half or two-thirds of his profits. "Now what am I going to do with my gas works?" he asks. Then the question came up that he must sell gas for some other purpose than illumination, and finally things developed as they are at present, and he had to go into the field and sell gas for fuel. Ordinary merchants in the country towns which use coal stoves, or wood stoves, or any other kind of a stove, sells the article that his customer calls for, and the article that he can make the most profit on. Now, you would not blame him for that; he has no interest in the gas company, but, on the other hand, the gas company must sell its gas through the medium of gas appliances, principally the gas range. I have, in my management of small gas companies, offered to hardware stores and dealers to furnish them with the stoves at wholesale cost price, and I have even gone so far as to install the stove in the same way that I would if I had made the sale myself at the price named. Well, how much money was there in it for me? Nothing of any consequence. I think that selling gas appliances in a large town is one thing, but in a small town the manager of the gas company has got to be very close to his people in order to sell his gas.

Mr. Britton: I would like to go back to Mr. Clement's idea that the gas works without the sale of gas for fuel would be of no value. The facts are that even in small towns where electric light is sold at flat rates that the amount of consumption for illuminating purposes is constantly growing, and in the larger towns it is growing in large proportions. We are selling at all of our towns more gas for illuminating purposes than ever before, and with the advent of all of the improved appliances for illumination the field is just as large and just as much open for the gas dealer in illumination as for fuel.

Mr. Clement: I only intended to say that when electricity first came to be an opponent of gas. I did not speak of the present time.

Mr. Britton: Yes, you are right—at that time. I would like to ask Mr. Cline if he encourages the dealers in stoves by doing the advertising on behalf of the company?

Mr. Cline: Yes, we continually advertise in the daily papers—just advertising gas as a fuel.

Mr. Britton: And do you employ canvassers also?

Mr. Cline: Yes, some, but it is hardly necessary to recommend gas to the people of Los Angeles.

Mr. Britton: I was very much struck with Mr. Cline's idea of establishing firms that will take care of the repair work. I think that is the most costly part of the distribution of gas for fuel. I will supplement what Mr. Hamilton has said about our experience in San Francisco. Shortly after the 18th of April a company was organized and operated for a matter of 60 days, so that the gas company was divorced from all connection with the sale of gas appliances. But the field at the present time in this city is in a peculiar condition, and it was thought advisable to again take hold of the sale of appliances, and we are now doing our own work in that particular. How long it will last will be a matter for the future, but in any event, we are doing this in San Francisco. The Gas and Appliance Department is an entity of its own, it is entirely separate and apart in jurisdictional matters and executive matters from the office. It is a department store of its own that will be held districtly responsible for results and cannot be handicapped by any other department or by any amount of red tape. It is very much like a separate concern, and we do encourage here in San Francisco the sale of appliances by all the dealers, as was done prior to April 18th. Mr. Leach has made the astounding statement, it does seem astounding to me, that but about 10 per cent of the gas appliances sold in Oakland are sold by the company. It does look like the dividing line is being very rapidly reached. Of course, it seems to me that we can control the kind and quality of the articles to be sold, because the dealer knows very well that the gas company, in order to protect itself, will at all times demand an appliance which will give satisfaction,

and if these are not sold, it is in the power of the company to so reduce the price to make it impractical for anybody else to sell them. I am strongly of the opinion that in the smaller companies, a company having an output of not less than 200,000 per day, that the best results can be obtained by taking charge of the sale of its own appliances, and by that gratuitous attention to complaints, it does make friends. In the large companies there is a limit reached, financially and otherwise, in gratuitous service, because of the mass of people, numbering in Los Angeles approximately 500,000 (I am giving you credit for all you are entitled to), and in San Francisco with a population at the present time of 550,000. The enormous amount of gratuitous work in a town of this size would simply swamp you, while in a small town it is to the interest of the company and to the local manager to do this kind of work, for he is making friends for the company. There is a difference between a large and a small company. I have preached that for the last fourteen years, that in our discussions here a man that has control of a large concern cannot give advice from his standpoint to the little fellow who only has a small concern, because generally the rules that apply to one will not apply to the other.

Mr. Cline: If the small company could get to that point where gas would be a universal fuel, and the dealer could not use anything else, you are in the same position as the big company then.

Mr. Lowe: I would like to ask Mr. Cline about what percentage of profit is charged by the dealers in Los Angeles. I would like to ask the same question of Mr. Leach. He stated that they charged a fair profit.

Mr. Cline: I should say from 20 to 25 per cent.

Mr. Leach: Perhaps 25 to 30 per cent.

Mr. Lowe: Is that about the amount of profit that a dealer would get in selling a coal stove?

Mr. Leach: I think so. I think perhaps on some of his coal appliances he may get a little more than that. There is one thing that is working to our advantage in the sale of gas appliances by the dealer, and that is that practically all of the new houses are being piped for fuel gas, and the dealer does not have to run the pipe to the kitchen in order to supply the gas. Most of the plumbers' plans now show a one-inch pipe directly to the kitchen. Consequently there is very little expense to the dealer in supplying the stove, not more than $1.15, but when he wants to set up a coal stove he has the water connection to figure on.

Acting President Miller: Gentlemen, you have heard a very interesting discussion on this subject. It seems to me that the only way we can get rid of the gas stove department is to make everyone use gas for fuel.

Mr. Lowe: There is one decided advantage in throwing the burden on the other fellow, and that is we miss the junk pile. Mr. Britton is the only man that I know of who has solved the question of the "junk pile."

Acting President Miller: Are there any more questions to be asked on this paper? Before the morning adjournment I will appoint the following committees:

Committee on Gas Engineers' Degree.
L. P. Lowe.
E. C. Jones.
John A. Britton.

Committee on Permanent Home.
W. F. Boardman.
E. C. Jones.
John A. Britton.

Advisory Board.
W. B. Cline.
John A. Britton.
E. C. Jones.

Committee on Obituary.
T. R. Parker.
John Clements.

Committee on Awarding Medal for Best Paper Presented.
R. L. Sterling.
F. E. Fitzpatrick.
T. R. Parker.

Meeting adjourned until 2 p. m.

FIRST DAY—AFTERNOON SESSION.

The meeting was called to order at 2:40 p. m.

The first paper presented was that by Mr. F. B. Shelton, "The American Gas Institute." In the absence of Mr. Shelton, the paper was read by the Secretary.

Secretary: I will say to the members that this was an idea started in the minds of some of the Eastern gas men—notably Mr. Doherty of Denver and Mr. Shelton of Philadelphia, to incorporate all of the associations in the United States into one general association, that is, that the parent association being the head, and the others being the subordinates. It has gone so far at the present time as to incorporate the Ohio, the American and the Western Associations. Mr. Doherty was here a year ago, and addressed us on the question of the Pacific Coast Gas Association joining the Gas Institute, and the Association appointed a committee, consisting of Mr. Jno. Martin and myself, to represent the Pacific Coast Gas Association at a meeting held in New York. Mr. Martin was the only one able to be present, and no action was taken at that time so far as the Pacific Coast Gas Association was concerned. Mr. Shelton's paper will explain what further has been done.

Published in Issue of September 22d

Acting President Miller: Mr. Britton, I would like to ask if a member of the American Gas Association or of the Ohio Gas Light Association would go into the Gas Institute automatically, as a member?

Mr. Britton: No, a member in good standing in any Association that went into the Institute would become a member of the Institute without an initiation fee. You can become a charter member simply by application. When an Association goes into the Institute the old Association goes entirely out of existence. I do not know that I can add anything to Mr. Shelton's paper any more than to suggest that possibly it would be advisable to discuss at some time during this session the advisability of the Association becoming a member of that Institute under the terms he mentions, of their control of the territory outside of our immediate territory, which would mean the relinquishment of our members who are not residents or inhabitants of the Pacific States territory, which, in our original constitution were defined as Washington, Oregon, California, Arizona, New Mexico and Utah, and that we would not take up any original work without the consent of that Association, and would assist in the work. The committee obviously cannot do anything now, but at the meeting in October of the Association undoubtedly such questions will arise and be settled. Mr. Miller advised me last night that he intended to be present at that meeting, and I suggest that he be appointed as a committee of one to represent the Pacific Coast Gas Association.

On motion, duly seconded, Mr. Miller was appointed as a representative of the Association to attend the meeting of the Institute to be held in Chicago in October of this year.

Mr. Berkley: I would like to ask whether we would retain the identity of the Association and not be merged, as was the Western Gas Light Association?

Mr. Britton: No, there would be no merging so far as State Associations are concerned.

Acting President Miller: We will now listen to a paper by Mr. A. E. Rix, "Some Economics in High Pressure Gas."

Published in Issue of September 22d

Acting President Miller: Gentlemen, you have heard a very interesting paper. I would like to hear from Mr. Berkley, as I think he can perhaps give us some points on high

pressure, as he has done quite a little of it in Los Angeles.

Mr. Berkley: In Los Angeles the maximum pressure is, I think, 40 pounds. The cost, including interest and depreciation upon the compressors and motors, is 1¼ cents per kilowatt-hour, including wages, but not including interest and depreciation on pipe line. It is quite a large plant, 425,000 cubic feet an hour.

Mr. Jones: I would like to ask Mr. Rix a question covering his last curve. Suppose you have a 12-inch high pressure steel tube carrying, say, 8,000,000 feet per day of 24 hours at a pressure of 26 pounds, which is the economic pressure for that amount? If you were to double the amount of gas to be forced through that tubing, would you recommend the increase of pressure in it or the laying of another larger pipe?

Mr. Rix: Without going into the matter very carefully, I should say right away that I would lay another pipe, because your quantity of gas to be pumped is so large that the number of thousand multiplied by its cost would be very much in excess of the interest or depreciation of the new pipe. As you increase the number of thousand, you increase the expense very materially.

Mr. Lowe: As I understand this matter, Mr. Rix's paper is merely supplementary to the one read by him last year.

Mr. Rix: Yes, the finishing touch.

Mr. Lowe: Then Mr. Miller's question might better be answered by the information you gave us last year?

Mr. Rix: Yes, sir.

Mr. Lowe: I will tell you one thing, gentlemen, the paper presented by Mr. Rix last year, plus this supplement, is worth putting in a pamphlet form. If you have to hunt through all the files of the Association Proceedings, it is a little difficult to trace it out, and I think that we can well afford to do this, inasmuch as he has given us this supplement, which is extremely valuable, I think it makes it doubly advisable, and I would suggest to the Association, I will make a motion to the effect that Mr. Rix's paper of last year, and also of this year, be compiled and printed in pamphlet form and distributed to the members of the Association. (Carried.)

I do not want to stop the discussion on this paper. As I said before, it is extremely interesting. Mr. Rix's work is remarkable, as it is entirely new—it is really pioneering work in the illuminating gas industry, and the natural gas men know more about these things than we do, but they do not tell us. Sometimes we find that they do not know as much as we think they do, and it is doubly valuable for that reason. I am sure that Mr. Rix would be glad to answer any questions that may be asked. There must be some questions arise in the minds of every one present.

Mr. Weber: Do I understand Mr. Rix to say that the first and second compression, or state of compression, requires two separate compressors, one compressing to 20 pounds and another from 20 to 40, and so on?

Mr. Rix: It is the same machine—what is known as a two-stage compressor. You pump the gas up to say 30 pounds pressure in the first compression, and then cool the gas to its normal temperature and take it into the second cylinder and compress it up to your final pressure. This is more economical, about 15 to 20 per cent, in the cost of compression, and then you can eliminate the high temperature in the compression, which might be detrimental to your gas.

Mr. Weber: Then you would recommend a two-stage compression above 90 pounds?

Mr. Rix: Yes, it would be almost criminal to use a single stage over 90 pounds.

Mr. Lowe: Will you kindly tell me why not at 60 pounds? It is my understanding of the matter that double staging really begins at 60 pounds pressure, and why do you recommend 90 pounds for the first compression?

Mr. Rix: I did not. I am speaking commercially. It would be difficult to get anyone to pay for two-stage compression at 60 pounds, that is, the question of capital investment enters into it. Really the machine is cheaper, it can be supplied for practically the same price, but in some way or other the minute you mention two-stage compression to a purchaser he immediately consults his pocketbook and thinks that he wants a single-stage compression. The man who operates it will want a dollar a day more wages, and it is difficult to sell a compressor to a man of the two-stage kind for a compression less than 90 pounds.

Mr. Lowe: The repair item on a double-stage machine must be greater?

Mr. Rix: No, it is less, and this one thing I want to call your attention to. Say, for instance, a single-stage compressor pumping up to 90 pounds has a thrust on its piston of 90 pounds per square inch, that goes back to the bearings, back to the crank pins, they would have to be constructed according to that pressure, and there is the friction against the bearings. Now, take it at two-stage—the initial pressure on a two-stage machine at 90 pounds is 23 pounds. You have a compressor working at 23 pounds and the other was working at 90 pounds. Now, the pressure against the pins is only 23 pounds, against 90 pounds in the single-stage machine, so that you are operating with less pressure. The machine can be lighter, the lubrication is better, and it will last infinitely longer—everything is reduced in that proportion.

Mr. Lowe: Say in a machine of 10,000 cubic feet per hour, pumped to a maximum of 85 pounds, would you recommend the purchase of a double-stage compressor, taking into consideration the added cost of maintenance of the single-stage machine.

Mr. Rix: I would.

Mr. Lowe: What is the relative cost of a machine of that description? In other words, how does the cost of a single-stage compressor and a double-stage of the same capacity compare?

Mr. Rix: A 10,000 cubic feet per hour machine would require about a 12-inch compressor cylinder. I think the ordinary single-stage compressor is worth $650 and the double-stage $850 or $900.

Mr. V. E. Britton: I would like to ask the question if the pressure on the two-stage compressor is the same for 90 pounds on the second stage, or is it at 90 pounds?

Mr. Rix: It is just between the two. That is, the active pressure against the working parts, but you must remember that the second cylinder is smaller than the first cylinder by just the relation of these pressures; for instance, if it was a 12-inch machine, the second cylinder would only be about one-eighth, or something like that, so that the total amount of pressure on the pins would be the same on each side.

Mr. Lowe: I will say, before Mr. Jones reads his paper, that some years ago we made it a rule in the Association not to offer a vote of thanks for papers, but it seems to me, as was done last year, that the rule should be set aside in the case of Mr. Rix. He has gone to a great deal of trouble to prepare this most valuable paper, and I move that a vote of thanks be given him. (Carried.)

Acting President Miller: We will now listen to a paper by Mr. E. C. Jones, "The Story of the Restoration of the Gas Supply in San Francisco After the Fire."

Mr. Jones: In preparing this paper I have studiously avoided the mention of any of the horrors following the 18th of April, and I have also not mentioned the fact that all plans and record books of street mains and services were either destroyed or locked up in vaults, and were inaccessible.

Mr. Barr: I would like to ask Mr. Jones what effect the earthquake had on the big holder that he speaks of in his paper?

Mr. Jones: When the shock of the earthquake came we felt pretty sure about our holder tank, but when I visited the works I found the yard around the tank had settled from two to three feet. It had gone down around the tank like a cuff around a wrist, leaving the tank in its original position without having settled out of level. The columns of the guide frame were plumb, after all of this twisting motion. There

was probably a motion of at least eight feet at the top of the guide frame, in addition to a rotation of something like six or eight feet. The holder tank showed a small crack, which was repaired.

Acting President Miller: If there are no more questions, we will proceed to the next paper by Mr. L. E. Reynolds, "How Electricity Was Served to Consumers and Street Car Lines by the San Francisco Gas & Electric Company After the Fire."

Mr. Berkley: I do not want to let this paper go by without an expression of tribute to those who did the work, to the men behind the gun. I want to thank them for it.

Mr. Reynolds: I was not to blame for being at San Francisco on April 18th, but I was here, and after I found what had been done and the difficulties that we had to overcome, I was glad that I was here. After I had listened to the paper by Mr. Jones I can see another bond between the electric department and the gas department. I never knew very much about gas, I was never interested in it, except to pay gas bills, until these complications arose between the gas department and the electric department. A great many of the gas mains ran along the side of our conduits, and every time a gas main blew up the manhole was a good place for the gas to collect, and it went up also, but the gas department afterward squared itself by letting me use part of their gas mains to build my mains in. There were three or four gas pipes in the streets, and as it was in the burned district, and they did not need gas, the gas department permitted me to use the gas mains. So we have another bond between the two departments.

Mr. Jones: Mr. Reynolds, as you have referred to the giving up of the gas mains on the part of the gas department to the electric department, for the reason, as stated, that we did not expect to get any business in the burned district, I would like to say, and I think you will agree with me, that today practically every street in San Francisco is served with gas. We have gas pressure in the burned district, but, as you all know, we have had several competing gas companies in San Francisco, covering a period of several years, and in some of the streets there are as many as five or six gas mains, ranging in size from 16 inches down to 3 inches. We found that it would serve our purpose better, and reduce our leakage, if we would transfer our service to one or two of these larger pipes in the streets; for instance, if there were a 10-inch and a 16-inch pipe on opposite sides of the same street down town, and several smaller mains which had belonged to these competing companies years ago, we would serve our end better by connecting our services to the two larger mains and scraping the smaller ones. Mr. Reynolds found that he could use these smaller mains as conduits for his electric system, but it was not because the people down town did not need gas.

Mr. Reynolds: I will call Mr. Jones' attention to the term I used. I did not mean that they did not need gas, but that they did not need it for a few days after the fire. There was nobody to supply gas to.

Acting President Miller. If there are no more questions to be asked on this paper by Mr. Reynolds, we will now pass to the reading of a paper by Mr. Leach on "The Equity of Sliding Scale Rate."

Acting President Miller: Gentlemen, you have heard Mr. Leach's very interesting paper on this question of rates. It is one of the most important in the gas industry. There are a great many various opinions on the subject, and it is likely that many of you share the opinions expressed by Mr. Leach in his paper, but the paper should call forth a good deal of discussion. I think that the final solution of the matter lies in a full and free discussion of the subject more than in anything else. I realize the fact that it has come to be the practice in this state to charge a uniform price, but as there are some companies represented here who are operating under a sliding scale, we would be glad to hear from them. Mr. Cline, what is your practice in Los Angeles?

Mr. Cline: We have a uniform rate for gas and a sliding scale for electricity, but I am a firm believer in a universal rate. I do not think that either of them should be sold on anything but a uniform rate, with the exception, perhaps, in some small cities where the rate may be very high. I think then it might be well to give a sliding scale rate.

Mr. Jones: What is your rate in Los Angeles?

Mr. Cline: Eighty-five cents.

Mr. Lowe: Mr. Britton is a man who, from time to time, has changed his opinion on the subject through his various years of experience. I would like to hear from him.

Mr. Britton: You do me an injustice. I have always been an advocate, as my work will prove, of a sliding scale gas rate. I was the instigator of the paper read by Mr. Leach. He approached it with fear and trembling. He was opening up to himself a new field of thought and did not know just exactly how to tackle it. I disagree entirely with Mr. Cline. I remember when the gas man, 30 years ago, was a demigod, in his own estimation—he didn't believe in anybody but himself and his stockholders—the public had no consideration; and until electricity, in 1882, began to stare him in the face he took no active part in promoting his sales of gas. He meant well, perhaps, and had a peak between dark and bed time that taxed every energy he possessed. He built big holders and stored his product during the other hours of the day that he might meet the supply during those two hours. Then fuel gas became a factor, and he has lessened his peak, but not entirely. He still maintains three distinct peaks, one for the morning hours, one for the noon hour, and one for dinner, and then the theater peak. We, in our days, in San Francisco before the fire of April 18th, had these various peaks. They were definitely marked upon our output charts. You could tell when people got up in the morning, when the old man went to work, when luncheon was served, and when the old man got home at night, and when the family went to bed, after they got home from the theater and cooked something on the gas stove. The gas appliance manufacturing concerns have in the last four or five years perfected many appliances calling for gas as fuel which has largely increased the use of gas. These are being found by our solicitors not only in San Francisco, in Oakland, but even in some of the smaller towns, appliances that were not dreamed of two or three years ago. The brains of our men are developing means for the utilization of gas for fuel purposes, and you have to meet competition in oil or in cheaper coal or in wood. It does not seem to me that there can be any argument against the proposition that if you can maintain a working force and invested capital both in your generating plant, and more particularly in your distributing system, that will represent as we say in electricity, a 90 per cent load factor, it is your duty to do it. Now, you cannot do that without making the rate and the price to the consumer one that will be attractive to him. The man that will put up a factory, as a can factory, for example, as men are doing here, and will come to you and show you that on a basis of 60 cents per 1,000 that they can compete with you, it seems to me that you are working against your own interest if you do not take it at 60 cents per 1,000. If your manufacturing costs are less than that cost, every dollar that you make from the delivery of a large quantity of gas to the consumer over and above your manufacturing cost is practically profit. There can be no question about that. The generating apparatus makes it, the holders store it, and your pipes distribute it, and your office collects it, whether your bill is for one dollar or for five hundred, and if the equity applies to your electric light service, why should it not apply in a greater degree to your gas service? In the electric light service you make a sliding rate, you establish a base rate, but you cannot store it up only in a limited degree. In the direct current service you have your storage batteries, of course, to draw upon, but you know how utterly impossible it would be for you to serve any

great degree of territory by your direct current service as against alternating. You can't store it up. With your gas you have profits in your tanks and in your holders. It costs you nothing to deliver it, and why should you not make a man who will give you a bill of $1,000 a month a better rate than a householder who will use only $1.50 worth of gas per month? It does seem to me that with a fixed standard or rate, where the man who will only use $1.50 worth of gas in a month, and who has electric lights in his douse, it does not seem that he should be put in the same class with the manufacturer who will come to you and offer to make a contract for a consumption aggregating as much as $1,000 per month or more. It seems to me that it would be fighting against the interests of the corporation which I represent if I turned him down. I think that the sooner we apply ourselves to the practice of selling our commodity, as every other commodity is sold in the market, the sooner we will get the confidence of the people. When we arbitrarily stand up and say that we will make a one rate for gas, and begin to carry it out, then you begin to invite trouble, and other conditions will confront you which will absolutely in the future work to the detriment of yourself. That is my strong stand on the subject. If gas in the holders costs you approximately 30 cents per 1,000, any amount over and above that that you can sell in large quantities is a straight gain, and you are throwing that money away if you do not take it in competition with any other fuel that you know yourself will compete with your gas. I am sincere in that, and have been for years, and if you will look back through the proceedings of the Gas Association some eight or ten years ago you will find that I was arguing for that very same thing at that time. Now, while I am on my feet I want to say one other thing. I do not want to let these papers on the restoration of light and fuel to San Francisco after the fire pass without comment. I felt a delicacy about getting to my feet, because I was one of the refugees before the fire. I went away from here on the 7th of April and was in mid-ocean when the fire occurred. I was not here to witness the efforts of the men in connection with this company in both departments, but I was back in time to witness what they had done, and I was here to witness the closing up of our affairs and to witness the work that had been accomplished. I have not been through anything that has been as calamitous, but I think that this Association should go on record before the meeting is adjourned to convince the people who will read these proceedings of the temperament and conduct of the people of this city during those dreadful days that followed April 18th. I know from letters that I have received from the East that the men back there are looking to us to say something today, something at this convention that will show to the people of the East what sort of temperament we have in California, and what sort of temperament we have, especially in the gas and electric business, here in California. Mr. Jones tells us but little, as he states everything about himself very modestly. Mr. Reynolds, his first effort, I think, in trying to write a paper, is very modest. Now, the men who are here today should go on record with an expression for the men who went through that calamity. Not only here in San Francisco, for there are men here from Santa Cruz, San Jose, San Rafael and other points. They had their trials and troubles, they proved their worth, and we of California are proud of California, we are proud of this part of our state. I do not want to talk any more, for, as I said before, I was not here and have no right to talk. I was not a witness, unfortunately, to the fire. I have wished a thousand times that I had been here and gone through it with the rest of the boys, but I was not permitted by the irony of fate, so I know only what I have been told. But I saw enough. I saw men broken down with the work they had done, nerves shattered, health gone—I saw the results of the work they had done. Some of them have gone away on a recuperating trip, but the men stood by it, and that is what I like about the men, and I think we ought to say something, and say it more positively than I can.

Mr. Lowe: The way to get Mr. Britton to tell you what he knows is to antagonize him a little. I discovered that a number of years ago. I believe it would be very fitting to appoint a committee to draft a resolution covering that period of the city's existence, and in connection with this resolution I think that Mr. Britton's remarks should be recorded.

Mr. Jones: Referring again to the matter of rates, I will say that in California there has been an argument against sliding scales for gas rates. In some of our cities there are charter provisions requiring the municipality to fix the gas rates from time to time, and I find that municipal authorities are apt to take your minimum rate as the price of gas in that town when they are fixing the rates, and you have to be a wee bit careful about naming a low price, because that seems to be a potent argument to the municipal authorities or the city fathers that that is the price at which you can afford to sell all your gas. They are slow to realize that there may be a reason for selling gas during the day time when it is not the peak hours—they overlook altogether the right to wholesale and retail gas as any other commodity is sold.

Mr. Lowe: I am inclined to agree a great deal with what Mr. Jones says, and I think that Mr. Britton, perhaps, loses sight of the socialistic tendency of the times.

Mr. Britton: Not me. I believe that if you establish low gas rates once, which under ordinary circumstances you could not afford at all, that the municipality is apt, as Mr. Jones says, to consider that a money-making rate, or you would not grant it, and they do not consider the reasons of its being a money-making rate. There is no question at all but that, after you reach a certain point in the development of your business, after you have passed the point of merely earning your operating expenses, that every foot of gas that you sell after that costs you practically nothing but the material that goes into the gas, and that is, of course, one of the reasons that the gas business is a good business, but the municipal authorities, however, do not recognize the fact that we lose money on a great many consumers, that we make money on a few, and they would be apt to consider any low rate a money-making rate.

Mr. Lowe: I am inclined to take sides with Mr. Cline. I believe in a single rate where you are to go before the public; there you do not handle each consumer individually. These are my views on the question entirely. I think if you are going to make a sliding scale rate of it, it should be based upon the amount of gas sold. I think that we can learn a great deal in the sale of gas by observing the movements of the railroad companies—they do not let us know their business. We can't do that as well in dealing with the public as a whole, and in doing so I believe it is best to develop your business probably a little slower, but treat them alike. If you do not, you are in a hornet's nest.

Mr. Cline: I might agree with Mr. Britton, in fact, I am quite sure that you can develop your business a little more rapidly by granting sliding scales, but you do it at the expense of many sleepless nights.

Mr. Newbert: How about the electric business?

Mr. Lowe: Unfortunately, this is not an electric convention.

Mr. Clement: In this connection, and speaking of the City Council and the regulation of rates by them, I have in mind a circumstance which occurred while I was in charge of the Salinas plant. One of the councilmen there was a brewer, and consequently a great friend of mine. He had a small ice plant in connection with his brewery, and for motive power he used a gas engine. Several times he visited our office in an endeavor to get a special rate for running his gas engine, for the gas, and after considerable discussion between the board of directors of the company and myself we decided to give this man a lower rate for gas for fuel. He was the largest consumer in the town, except the hotel in that place. This was in mid-summer, and the rates were to be fixed by the Council in February. This man was a member of the Council, and took as a basis for the fixing of rates the price that

we charged him for his power, and as we could afford to sell him gas for power at a reduced rate, he conceived the idea that we could sell it to everybody else at the same rate; so you see the difficulty of a sliding scale in a small town.

Mr. Leach: I think that is only a question of misplaced confidence. I think the majority of our Councils and Boards of Supervisors are fair and rational, and I do not think that we need give any such importance as has been expressed by Mr. Clement to the matter of municipal regulation of rates. The bugbear of municipal legislation does not affect the electric side of the business. We go right ahead and give them a sliding scale in spite of the municipality. I am certain that all the members, or most of them, take into consideration the fairness with which the company treats its consumers. Of course, once in a while you will come in contact with a socialistic board, but not often.

Mr. Britton: I would like to say in reply to Mr. Leach that the Boards of Supervisors of San Francisco in the past have recognized the equity of a sliding scale of rates for electricity. They have been argued with by everybody in connection with the gas and electric light business. They have recognized the equity of it by making a very mild sliding scale of from 9 to 5 4-10 cents per kilowatt. But we all know that current is sold in San Francisco at a very much less price than that. Now, I think they are open and amenable to argument on the question of a sliding scale rate for gas, and, besides that, they based their rate not upon the quantity consumed, but they have gone further than that in the past and have given this company the right to charge upon the basis of installed capacity, so that a consumer who has a large installed capacity which he uses only on one or two occasions during the year will pay a higher rate per kilowatt for his current than a consumer who has a smaller installed capacity and uses it all the time. Now, the same arguments that have prevailed upon the Supervisors to make a sliding scale rate for electricity surely would be as potent to them on the question of gas, and because we could afford to make a minimum of say 50 or 60 cents per 1,000 would be no argument that we could sell our entire output at that figure. The only provision that I am afraid of in the California charters is one that the city shall receive as low a rate as any other consumer. It does not qualify it by the usual statement "for like service," but it is broad, and you cannot afford to give a city like the city of San Francisco or Oakland the lowest rate that you will charge anybody else. Why should the city pay more? Because you contribute to its taxation. But the city should get a smaller rate. The large consumer that needs no collector to call for his bills, and that pays dollar for dollar, should get the benefit of it. He sends his check the day the bills are sent, or the day afterward, and your loss is nil.

Mr. Jones: I think we are on very dangerous ground, when we know that a certain output of gas costs a certain amount of money for distribution and fixed charges, and that any consumption of gas over and above that amount may be sold at a slight profit over and above the cost of gas in the holder. This, it would seem to an ordinary business man, would be placing the burden of the distributing cost and fixed charges on the upbuilding business of the city to a certain point and to a certain amount of your gas consumption, of carrying your fixed charges and distributing costs, and the other man who came in afterward would operate at their expense by getting gas at a lower rate.

Mr. Pearson: I have always been prejudiced against this sliding scale, but Mr. Britton has converted me. I am sure, I am willing to acknowledge it, and to try it. In Cincinnati they are selling gas at $1.50 through one pipe and at 75 cents through another—all the same gas. At Bloomington, Ill., they were doing the same thing until about 18 months ago. They were getting $1.35 for lighting and $1.00 for fuel—all from the same plant, maintaining two meters. This same question came up with the Council, to take the lowest minimum rate as the basis for making a rate. It was not any too much nor too little. A dollar was all right, and the company finally adopted $1.00 as the rate. Personally, I know that their business has increased so materially that the receipts of the old company do not compare with that of the new. I heartily agree with our friend Jones as to our liability, and some day we have got to come to this. There is no doubt about it. But, referring to Mr. Britton's idea, I feel that the man who burns 150,000 cubic feet of gas is just as much entitled to consideration as any other wholesaler, and if you cannot explain it to a town council, then there is something wrong with the explainer.

Mr. Lowe: There is one feature in connection with this discussion that strikes me, and that is that the electric end of it is benefited by the bad stand of the gas men as before the community. A number of years ago the gas men were carrying the brunt. We taught everybody what a cubic foot meant and they knew just exactly what they were getting for their money, when the electric man entered the field and beat us over the head with watts and volts and ohms and all of these mysterious terms, and which the city fathers did not yet understand. If they had known what they were they would have gotten after them with a sharp stick. I know very well that at the various times that the company has gone before the board that their great thought has been to maintain a gas rate. They would spend days and nights in going over the question of gas, and open their books and teach the Supervisors what gas costs delivered to the consumer and what rates they were rightly entitled to. They would pass the electric rates up to the eleventh hour, and after about thirty minutes' explanation they would settle the electric rate question, because they did not know what they were talking about. This is the only reason that you have been able to obtain the exalted position over the gas man. I think that when the question becomes better understood that there will be no such thing as a sliding scale. I am a firm believer in it. As far as the development of the business is concerned, and for the general peace of mind of the gas man, I think his best plan lies in serving a general rate.

Mr. Pearson: Before this subject is passed, I move that a committee be appointed to draft a resolution covering the remarks of Mr. Britton, covering the excellent work done by the Gas and Electric Departments in the city of San Francisco in her distressed hour. (Carried.)

Acting President Miller: I will appoint on this committee all of the Past Presidents of the Association in attendance at this convention, with the exception of Mr. C. E. Jones.

Acting President Miller: Before the meeting is adjourned for the day I will appoint the Committee on Nominations as follows:

Mr. E. C. Jones, Mr. W. S. Cline, Mr. W. F. Boardman.

Meeting adjourned until 10 o'clock Wednesday, September 19th.

WEDNESDAY MORNING, SEPTEMBER 19, 1906.

The meeting was called to order by Acting President Miller at 10:50 a. m.

Acting President Miller: We will now have the report of the Nominating Committee.

To the President and Members of the Pacific Coast Gas Association:

Gentlemen—Your Nominating Committee begs to report with the following recommendations:

For President, Jno. Martin of San Francisco.

Vice-President, C. O. G. Miller of San Francisco.

Secretary and Treasurer, John A. Britton of San Francisco.

Directors, Wm. Baurhyte, Los Angeles; John S. Kaneen, San Rafael; Van E. Britton, Santa Cruz; Edward A. Rix, San Francisco.

Your committee also recommends that the Secretary be empowered to employ an assistant, at a compensation to be

fixed by him and to be paid out of the treasury of the Association.

Respectfully submitted,

E. C. JONES,
W. B. CLINE,
W. F. BOARDMAN.

Acting President Miller: In the absence of Mr. Martin I will call upon Mr. Britton to make a few remarks in his behalf.

Mr. Britton: I may be able to represent Mr. Martin in some particulars, but certainly not in most of his acquirements, both physically and mentally. I will say, on behalf of Mr. Martin, that there is no one here this afternoon that feels more keenly than he, the fact that he could not be with us at this time. He would have made any personal sacrifice to have been here, but it was beyond him, he could not escape the necessity for his trip to the East, and I know that he will appreciate the compliment that has been conferred upon him by the Association in electing him for another year. It has been the wish of Mr. Martin's existence, as a gas man, ever since the first day that he came into the Association, fourteen years ago, when of his own volition, he presented to each member of the Association, each charter member, a gold badge which became the insignia of the Association. He was not then a member, but subsequently became one, as you know. When he became a member he was an electric light man, pure and simple, and had little or no use for the gas man; but he has been educated. He is now more of a gas man than an electric light man. That, Mr. Jones will testify to better than I can. You have honored a man who is entitled to be honored. There is no man in the State of California to-day, and I speak without prejudice, who has done as much for the development of both the gas and electric industries of the State, as Jno. Martin, and back in New York, as he is to-day, he will receive with delight the telegram which I shall send him, advising him of the very complimentary action of this body, and you can depend upon it, that next year he will give you a meeting that you will all be proud of.

Secretary: I have received the following telegrams, which I will read to the Association:

"Tacoma, Wash., Sept. 18, 1906.

"Jno. Martin, President Pacific Coast Gas Association, San Francisco,

"I make motion that papers be distributed before next meeting. It would tend to more intelligent discussion and encourage diverse expressions.

"A. ALDRICH."

"Tacoma, Wash., Sept. 18, 1906.

"John A. Britton, Secretary Pacific Coast Gas Association, San Francisco, Cal.

"Hearty congratulations and best wishes for a bumper. Having just succeeded to management here, impossible for me to get away. Put us down for four subscriptions.

"W. A. ALDRICH."

Acting President Miller: We will now listen to a paper by Mr. Sherwood Grover, "Experiences with High Pressure Gas Mains."

Published in Issue of September 22d

Mr. Cope: I would like to ask Mr. Grover if he has any data, or if he has ever found out, about the proportion of water that would go into a high pressure main per million feet of gas.

Mr. Grover: I will have to say I have no data on the subject. I have never made any calculations.

Mr. Jones: I think it would depend entirely upon the humidity of the gas; it would also depend upon the compression. It is possible that the water may be prevented from entering the main system.

In relation to Mr. Grover's excellent paper, I want to say a few words. The handwriting on the wall at Belshazzar's feast, "Thou art weighed in the balance and art found wanting," was applied to all cast iron main systems in California by the earthquake of April 18th, and the only thing that saved all the cast iron mains were the lead joints. Much has been written about the comparative excellence of cement and lead joints for joining cast iron pipes, and the balance has always been in favor of the cement joint on account of its great strength, and while a cement joint is much stronger than an ordinary cast iron gas pipe, where the pipe is drawn apart by the frost, as in Eastern States, the cement joint holds and the pipe is broken back of the bell rather than at the joint; but the argument is only in favor of lead joints in earthquake districts. Lead joints are the only safe ones, notwithstanding the fact that all lead joints leak in a measure. In the corporation, we have nearly sixty-five miles of high pressure steel gas mains. The earthquake of April 18th did not disturb a foot of these steel mains. There was not a broken joint, and the pliability of the pipe is what saved them. High pressure systems have a great advantage over all low pressure systems in the matter of testing for leaks. If you find it impossible to shut off your consumers for a few moments to test, when there is little consumption, gradually increase the pressure on your system, if you are carrying 25 pounds give it 50 for an hour's time, and watch your gauge, and you can determine by the drop in the gauge pressure whether there is any change, or much leakage in the mains.

One other matter, the provision of initial storage of gas on high pressure systems, under greater pressure than that carried on the mains, is of importance. The wisdom of this has been questioned by some Eastern engineers, and that led us, on the Coast, to determine whether they or we were right. If you are using a steam engine, as a motive power, or an electric motor, the current may be cut off, or there may be some mechanical difficulty with either of them, and you are apt to have a stoppage, it may be for 10 seconds, or it may be for 10 minutes, but these stoppages in electricity seldom last over 5 or 10 minutes. That is considered a serious breakdown to electricians to-day. If you provide compressors, sending gas into the high pressure mains at a moderate pressure, say 20 to 40 pounds, large enough to carry the peak hour, and then provide in parallel, smaller high pressure compressors to say, the limit of the mechanical capacity of first stage compression, about 80 pounds, and let the smaller compressors pump during the day into the pressure tanks, which I would say should amount to as much as 20 per cent of the peak hour, then you are provided with a storage of gas under high pressure, and this should be automatically fed into the lower pressure gas mains by regulators so that it does not depend upon any man's memory to keep the system in gas. Immediately you have an accident, and the motor stops, these compression tanks begin to do their work. They feed from 80 pounds to 40 pounds, and bridge over the time that the power is off. This is a most important feature, and it is a source of a great deal of comfort and satisfaction to the man in charge of the station.

Acting President Miller: I think Mr. Jones' remarks have been very interesting, and I would like to hear from Mr. Campbell on this subject.

Mr. Campbell: I think Mr. Jones has covered everything I would like to say. I noticed that Mr. Grover's paper mentioned that he had to use drips, and I wondered if that was necessary. I have a high pressure system, and do not use drips, and I have never had any trouble with it. I carry about 80 pounds on the tanks and 3 pounds on the mains.

Mr. Jones: Mr. Lowe once said a very true thing, and I think it is worth repeating, because I think it will appeal to you. "When it rains outside, it rains in your gas holder, and in your mains." The amount of water in gas depends entirely upon the humidity of the air, and gas under atmospheric pressure, with a slighdy increased pressure due to the weight of the holder, is practically of the same humidity as

the air outside, so that the amount of water in the gas varies from time to time.

Mr. Britton: It might be well to read a little history into this discussion. California, and the Pacific Coast Gas Association, should take to itself the credit of having been the pioneers of high pressure gas distribution. To it the credit belongs, of having men in the Association who have worked out all of the problems. While there has been in the Eastern States, among a few companies, a demand for the supply of gas under high pressure, there has not been that concert of action that there has been in California. It has gone down in history that the city of Oakland was the first city in the world to serve artificial gas under high pressure. It is true, in a crude way. Mr. Eichbaum, one of our senior members, who is here to-day, had something to do with the first installation. That was improved from time to time, until it was taken up by Mr. Jones actively, who solved all of the problems that concern high pressure gas distribution until to-day it is what you all know it to be. Further than that, in the early days when experiments were being made with high pressure gas distribution, a certain amount of secrecy was observed. It was thought to be one of the trade secrets of the profession, and those of us who were undertaking high pressure distribution and trying to overcome its difficulties, wanted to keep it to ourselves; gradually it has leaked out, until this time the world is getting free, practically, information from men like Mr. Jones, Mr. Rix and Mr. Grover. They have given you facts here to-day covering the costs, practical utility, and the means and methods of high pressure gas, that have been arrived at in the years of our experimenting, which has made it effective, as it is to-day. As Mr. Jones says, I think that those of us who have been right in the fight, could talk to you all day on that question, involving new thoughts that have come to us, and some entirely new ones that we are experimenting on now, which Mr. Jones has in hand, that will cause the scions of the gas world to open wide their eyes, because there are new developments that never have been thought possible in this one question of gas compression and high pressure distribution.

I just wanted to say this so that it will be read into the record that we are taking to ourselves the credit for all of this work, and the credit of having the men who have been able to handle it; and it occurs to me, and I make it a suggestion that perhaps it might be well in that pamphlet which we are about to issue of Mr. Rix's, some excerpts at least, if not the whole paper of Mr. Grover's, on the technical end, follow the development of the technical end that has been developed by Mr. Rix.

Mr. Low: I can give you a little idea as to the twisting of high pressure gas mains by our own experience at Palo Alto. At the time of the earthquake, there was probably no locality that suffered a more severe shock than Palo Alto. Those of you who have seen the condition of the University Buildings, and recognizing the fact that every two story brick building in Palo Alto was shaken, know something of it yourselves.

The line of the fault is about six miles from San Francisco, while it is only about three miles from Palo Alto, consequently, the shock was very much more severe. We had in Palo Alto something over 12 miles of mains, and something over 500 service pipes. We get our gas from Redwood City, about five miles distant. Our plant consists of four compression tanks, 12 miles of mains, and 500 services. The Redwood City plant was put out of commission for a few days. The first act of our manager was to close off our services, so that when the gas came on, there would be no danger of sending gas into houses which possibly might have suffered to any particular degree. We were anxious to test the mains, and this afforded an admirable opportunity. When the gas was finally turned on from Redwood City, we found that we did not have a single leak of any description. The mains were absolutely tight, notwithstanding tanks, mains, services, and the entire works stood the very severe disturbance of the earth at that point.

Mr. Britton: The fact that your tanks were not disturbed was that they were buried beneath the ground.

Mr. Newbert: I may state that the high pressure mains between Redwood City and Palo Alto, and also between Redwood City and San Mateo, tested out perfectly after we turned the gas on, and did not show a single leak. It was a splendid opportunity to make the test, and we found no leaks in any of our high pressure mains, and, while Mr. Lowe has stated that the plant was damaged, so far as our holder and generating apparatus, our compression tanks and regulator connections were concerned, they were not disturbed in the least.

Mr. Britton: I would like to ask Mr. Jones if that is not true of the gas line that we have in Oakland? We have two lines in Oakland, a backbone line, through the center of the town, and a line running practically at right angles to it. We also have a line between Santa Rosa and Petaluma, the longest line we have, and you all know how effective the disturbance was at Santa Rosa, and there was not a leak or break in any of our lines.

Mr. Jones: I have not had a single leak reported to me on either of these lines. The Santa Rosa-Petaluma line, 17 miles in length, was in operation, and the Oakland lines were tested and showed no leakage. The various high pressure couplings are being improved from time to time, and one of the latest improvements is the substitution of a steel barrel for covering the joint of the two pipes. Formerly it was cast iron, but with the use of the steel barrel the joint is as flexible as the pipe. The flanges are so closely drawn that it is utterly impossible for any gas to get near the rubber gasket (excepting a feather edge), to cause it to rot and produce a leak.

Mr. Grover: The actual reason, I believe, is said to be that there is such a small surface of the rubber exposed to the gas. Mr. Dresser, who has had a good deal of experience in regard to the life of a coupling, claims that he has taken couplings apart after they have been in the ground from 25 to 30 years, and found that the rubber was in good condition.

There is one thing that I want to speak about in connection with the earthquake, and that is in connection with our pipe in Oakland, that goes across what is known as the 12th-street dam, as it is called in Oakland. It is a concrete culvert through which the water from Lake Merritt runs to the Estuary, and across this dam we have two mains, one an 8-inch cast iron main, and the other a 6-inch high pressure main, laid about 15 feet apart, and both built into the solid masonry. When the earthquake came, it broke the Contra Costa Water Company's pipe there and washed out quite a little of the roadway, and broke our 8-inch pipe on both sides of this masonry, the ground sinking down 18 inches to two feet. While we were working on the 8-inch main, we looked up our high pressure main, and found that there was only one place where the road had not fallen and that part was held up by our high pressure main.

most effective?

Mr. Grover: We use entirely the Chapman Fulton regu-

Mr. Grover: We use entirely the Chapman Fulton regulator, except on house services, when we use the Equitable regulator, and in some cases the Johnson-Reynolds.

Mr. Van E. Britton: I would like to state that at Santa Cruz, we discovered that our leakage was in the cast iron system, but in the new 2-inch high pressure system that we have been putting in, there was not the slightest disturbance at all, and no leaks. Of course, our own system was broken by the earthquake, and in several places throughout the town, the mains were carried out, but in the wrought iron system there were no breakages or any leaks.

Acting President Miller: Has anyone had any experience with the life of steel pipe?

Mr. Jones: The life of a steel pipe is a good deal like estimating the life of an individual. The insurance companies have a nice way of doing it, but they fail once in a while. It depends almost entirely, I might say, on the coating, and the manner of handling the pipe. It, perhaps, is not generally understood that it is not the thickness of the pipe, but the coating that is the most important, and the handling of it subsequent to the coating—while it is being laid. Two-inch plain end tubing should be thoroughly scraped free from all rust, and then it should have a good coating of red-lead and oil. We have found that to be the best protection. After it has been coated, no tools should be used on the pipe. It should be handled carefully. It should be placed in a wagon on a felt, or some other sort of a cushion, so as not to scratch the coating, and the pipe should be handled without tools of any kind, or anything that will in any way mar the coating on the pipe. The length of life of the pipe should be in decades and not in years. I see no reason why a 2-inch pipe should not last thirty years. We found that in using the best quality of red-lead and the best quality of boiled linseed oil, having it thoroughly mixed, and permitting the paint to dry without the use of any dryer (any turpentine or Japan, which would make it dry quickly and brush off), that that was the best possible coating. It prevents oxidation where it covers the steel, but the red-lead itself is subject to changes, which have been very disagreeable to us, and I am almost ready to propose, in fact, I will say that I am ready to use one good coating of red-lead on the pipe, after this is thoroughly dry, to cover it with a good metallic coating. I do not want to advertise the paint, but I mean such paint as we use on our gas holders. It is an iron oxide, made by some of the Eastern manufacturers, and sets with a gloss, and is very durable. I put it on gas holders and they retain their brightness for four or five years, although I do not say it is desirable for the gas holder to go as long as that without recoating. I believe in using the red-lead next to the steel pipe, and protecting the lead with another coating of metallic oxide, iron oxide, such as we use for gas holder tanks.

Mr. Lowe: We are meeting with a very peculiar condition in Honolulu now. The street mains in Honolulu were coated with red-lead, and it is commencing to cause trouble in some localities, but not in all parts of the city, and we are looking for a better preservative, and under the circumstances are turning to the water company, who have had very much more experience than we have. They state that the only thing they have been able to find that would stand in that soil is galvanized pipe.

Mr. Jones: I think if you will use one coating of red-lead and the asphaltum on the lead, that it will last. This method is strongly advocated by the firm of Low Bros., paint manufacturers somewhere in Ohio. They publish a very interesting pamphlet; it is almost a treatise on painting, and they are manufacturing all kinds of paint. They strongly advocate the use of red-lead covered with an iron oxide.

Mr. Berkley: I will ask that Mr. Cline give some of his experiences in Los Angeles.

Mr. Cline: The Los Angeles Gas and Electric Company has been operating a high pressure system something like three years, and the existing systems of about, I should say, thirty miles of standard wrought iron pipe. It is twelve inches, and probably twenty miles of 2-inch pipe. Part of the system is used for a feed line to the low pressure system, and is tapped in, I think, at about six different points with district governors set for an outlet pressure of about eight inches. We have about 5,000 consumers on the high pressure lines, and our house governors are set for a pressure of three inches. The pressure plant consists of three compressors, two of the capacity of about 175,000 cubic feet, an hour each, and the other of a capacity of about 75,000. They are run by electric motors. We have no compression tanks, and we have never had one moment's interruption. We have never had an accident of any kind, and it has been most satisfactory from the time of its inception.

Mr. Berkley: What type of governors do you use?

Mr. Cline: Equitable.

Mr. Lowe: There is one thing I think Mr. Jones should enlarge upon in his remarks of plain end pipe, and the necessity for not handling the pipe with tools, etc. This is all right for a 2-inch pipe, but when you go to lay down a service pipe, I think he should add a cautionary word or two.

Mr. Jones: We are very careful in laying the service pipes, not to injure the coating, and the men are instructed to repaint them. Every injury is recoated.

Acting President Miller: We laid an 8-inch pipe four or five years ago. The pipe was painted before it was laid in the ground, and then after it was laid, a man went over it and painted it again.

Mr. Weber: It seems that the majority of the members seem to be interested in high pressure gas. Mr. Jones has thoroughly gone over our condition at Petaluma. We have a pipe line between Santa Rosa and Petaluma, which is nearly seventeen miles in length. It is a 2-inch steel pipe, with smooth ends, and connected with Hammond couplings. This pipe was tested immediately after the earthquake, including the compression tanks and condenser tank, and was tested up to the regulators, and was disconnected at the regulators, which is almost in the center of the town. It was found perfectly tight. The compressor was kept on over one-half a day and did not drop the least bit. I would state that for services to individual consumers, we use a ½-inch pipe, which is painted with two coats of red-lead, and any tool marks that may be made on the pipe are thoroughly painted over and tested before the pipe is covered, and in that way the pipe is protected as far as anyone can protect it by paint. We run two pounds pressure on our mains to the town, and then we use the Equitable individual governor for individual consumers, in some cases having as high as six meters on one service, but the ½-inch pipe always gives ample capacity to supply every customer.

Mr. Lloyd: I understood Mr. Jones to say that he did not use or recommend the screwed pipe for line pipe, and I notice that he uses in all of his installations plain end couplings instead of the line pipe couplings or screw end.

Mr. Jones: It is now well known that all threads in ordinary wrought iron pipe couplings are straight threads. The threads on the end of an ordinary piece of wrought iron pipe are cut with a taper die. The threads on the inside of couplings that are supplied with the pipe are ordinary straight threads, so that as you screw the taper thread into the coupling, the joint depends on two or three threads, so that in nearly every instance the pipe screwed together with ordinary couplings will leak. If it does not at first, it will develop later. Our next step to remedy the trouble was to use line pipe sockets, which are of extra length and heavy, and are supplied with taper threads to correspond with the threads on the end of the pipe as cut with the ordinary pipe dies. This, we found, required much care in making the joints. It required the use of holding on tongs, and that the joint should be made up and left, i. e., the joint should not be disturbed. There is great danger in screwing lengths of pipe together. Each joint should be made separately. For that reason we have abandoned the use of screw joints on any of our high pressure feeding or distributing mains, and only where it is absolutely necessary on pipes below two inches in diameter. The high pressure couplings, as they are made to-day, are comparatively cheap, they are easily applied—the rubber, even if it is not durable in the presence of gas, will last many years, because only a feather edge of the rubber comes in contact with the gas, so that the amount is no more than the thickness of a sheet of paper, and the rubber will last for many years, if it is not disturbed. I have found, however, that it is impossible to take the rubber gaskets from the pipe and use them over again, the rubber adheres to the pipe, making a permanent

joint. I believe that it will last many years.

Mr. Van E. Britton: I would like to ask Mr. Jones what method he employs in making a compression tank tight before they are put into service.

Mr. Jones: The best way to make a compression tank tight is first to select some good, honest boiler-maker and ask him if he will make a tank of certain dimensions, certain thickness, to stand a certain pressure, and put it up to him, and if that man don't work out a way of making it tight he will lose money. As a last resort, if the tank should leak, fill it with a solution of salimoniac and rust the leaks. It has been found of advantage, after the tank has been riveted and tested, to coat the seams on the inside and the heads of the rivets with a mixture of shellac and black oxide of manganese. In order to use this preparation, the black oxide must be very evenly ground, as fine as flour. Mix it with the shellac, use no oil, thin with alcohol, and mix only enough for present use. Do not try to use it over again. This will, in nearly every case, stop small leaks, but it is better to make it tight from a boiler-maker's standpoint.

Acting President Miller: Gentlemen, you have heard a very interesting discussion on this subject, and I think we have all benefited by it. We will now pass to the reading of the next paper, by Mr. Clement, on the "Art of Canvassing."

Acting President Miller: Gentlemen, you have listened to a very artistic paper at the hands of our past President, Mr. Clement. I am sure it is a subject of interest to all of you, and I would be very glad to hear a full and free discussion on the subject. I know that Mr. Clement would be glad to answer any further inquiries. I think I saw Mr. Berkley's notebook working again.

Mr. Berkley: I think the cardinal points of the paper are well taken. I do not think that I could say anything that would add particular weight to it, because he has covered the subject entirely. I do not believe that we can lay too much stress upon the art of canvassing. I rather like that term. There are only a few people who can do it and do it successfully, and I think there is one of the places where we fall short, that we do not have enough artful solicitors and canvassers.

Mr. Lowe: I believe that the matter has been very carefully covered. I believe that someone has said that the art of anything is having your heart in it, and that without heart there can be no art. The success of a canvasser or solicitor depends very largely on his heart being absolutely in his work, loyalty to the gas interests, aside from personal questions and personal interests. I believe that the success of a company depends more largely perhaps on the canvasser and solicitor than on any other man, as he comes more directly in contact with the public.

Mr. Clement: Within the last two weeks I was in Berkeley making a survey for an extension, and one lady in the neighborhood had made application for a service. She had just moved into a new house, but expected to get in there three months before. I said to her: "I came here to see you about gas service." She said: "You did? Do you know that there is the biggest lot of liars in Oakland and Berkeley than any place I have ever seen. How do I know that you are representing the gas company?" You see there is a big lot of liars here, and I admit that I am something of a liar myself.

Acting President Miller: Is there any further discussion on this paper?

Mr. Kinney: I think that one of the best methods to become a successful solicitor is to make business friends who will assist you and help you in a business way. No matter whether it takes a day or a month, or a year, make friends that are of value to you. It is worth working for, and I believe that the most successful solicitors in the business world are those who make the most friends.

Acting President Miller: Mr. Britton of Santa Cruz has been devoting a great deal of time of late to extending his system and getting new business. I would like to hear from him.

Mr. Van E. Britton: We have been somewhat handicapped during the last few months in Santa Cruz in having more business come to us than we could care for, owing to the condition of our mains, and another drawback has been our inability to make a proper display room.

Acting President Miller: We have listened to a very interesting paper, and I know that we have all benefited by it. The meeting will now adjourn until 2 o'clock p. m.

AFTERNOON SESSION, WEDNESDAY, SEPT. 19, 1906.

The meeting was called to order at 2 o'clock p. m., Mr. Lowe in the chair.

Mr. Lowe: The first paper to be read this afternoon will be that by Mr. E. C. Moore, on "Personal Experiences with a Municipal Gas Plant."

Mr. Moore: When it was suggested that an article be written on this subject I felt reluctant, for two reasons, the first one being that I am not a specialist in the gas business, and my connection with this work came in as an adjunct to my other employment.

Published in Issue of September 22d

Mr. Lowe: Gentlemen, you have listened to a most excellent paper at the hands of Mr. Moore. I believe the Pacific Coast Gas Association enjoys the distinction of being the only Association which includes in its membership a municipality. We welcome them with open arms, and for the first time, I think, in the history of the gas world, we have had a paper from a municipal ownership man, who would be glad, no doubt, to answer any questions you may desire to ask.

Mr. Berkley: I want to say in connection with this paper that in the first place it is a consideration on our part as independent operators that Mr. Moore has put it in a very serious and sensible way. The first thing that struck me was that they are selling gas for $1.50 per 1,000. That does not just exactly meet the ordinary demand of municipal ownership, but he rightly says in the wind-up of his statements that they cannot afford to sell it at a less figure, because of conditions which are overlooked by the ordinary individual when they are talking municipal ownership. I know that in the Middle States where municipal ownership has been agitated the claims were made that we must have gas at cost. To the ordinary layman that statement meant something, but it did not mean anything except financial failure. I think the gentleman is really entitled to a great deal of credit, for while he states the price, he also states that it cannot be sold at cost. They are operating at some profit, but, of course, he did not say how much. Inasmuch as the mayor has acted in the same capacity for ten years or more, we would hardly consider that this is a fair test of the word municipal ownership, because it has been under the control of the same hands so long. Ordinarily municipal authorities are changed and new men brought into office, but in this case we have to give them credit for continued service of the same men. I must say that I admire the paper very much, and, as Mr. Lowe says, it is the first paper introduced in a gas convention of this character and nature.

Mr. Britton: As probably every member of the Association knows, I have been a strenuous opponent of municipal ownership for the past twenty-five years. I have written volumes myself in opposition to it, and attempted to show up the fallacies of the reports which were made by municipalities, covering their costs, particularly of electric light plants. I was induced to ask Mr. Moore to write this paper by having gone over the reports of the town of Santa Clara, setting forth the results of their operation of both their water and gas plants and electric light, and moreover because of their fairness in buying current from the San Jose Light & Power

Co. and the United Gas & Electric Co. for the operation of motors, etc. It showed a broad spirit and fairness that I had not met with in other advocates of municipal ownership. I knew Mr. Moore would bring out something that was worth listening to. If all of the municipal ownership plants in California would be as frank, honest and fair as the San Clara plant we would have nothing to fear in the way of municipal ownership. It is readily observable that where the conduct of corporations changes, it very seldom makes any advance, excepting against its own will, in a degree, and the fallacy of success in municipally owned plants is due primarily to the lack of management and the lack of government and knowledge. In all municipally owned plants in California a man seldom holds his position, even as engineer in the plant, for a longer term than the term of his friend in the council or trustees, and there is no incentive. They are very careful, however, and it has been the habit of all of these towns to hide actual expenses. They are very careful to avoid the question of expenses of operation of one utility by charging interest to the other. I have in mind a town in California, in this case, having a water and electric light plant, that is very careful to charge to the expenses of the water plant any surplus of expenses over receipts in the electric light plant, because the water plant can bear the burden of expense where the electric light plant cannot. I do not think that in California we need to have any fear of a very great stride in municipal ownership, if the companies in the state of California will study their own interests. The policy of the gas and electric light men today is very much broader than it was a few years ago. It is broadening every day, not only in the reduction of rates to pay interest on capitalization, but it is broadening in their line of duty to the municipality. It has generally been said that the municipal action was a good thing. Prices ordinarily were charged in times past to municipalities by gas and electric light companies far in excess of the rate which was given to private consumers, and that made necessary the enactment of statutes now in force in California in nearly all of the charters in all of the cities providing that a city should pay no more for its commodity than is paid by the most favored company, and gas companies forced that issue upon themselves, and they forced municipal ownership by the little exactions that merely antagonize. I think all over the world to-day that the question of municipal ownership is easing up with us as to our particular industry. I think they are looking more to the requirements of other utilities that present a better opportunity of profit with less engineering skill and talent to carry it through. There is a commission now, I think it is in active operation, that is composed of pro-municipal men and anti-municipal men, and they in turn selected others who were unbiased and unprejudiced, and they have started an investigation of plants in Europe and propose to finish their investigations here in America. It is anticipated that it will take some four or five years to collect all the data, and I think that since it was organized they have taken up also the question of street railways, so that we will have, within a short time, practically a board of arbitration and statements that will enlighten the public as to whether municipally conducted plants can be admitted to be as economical in the end as privately owned plants.

Mr. Moore: Regarding the question of profit, I have here two or three copies of the clerk's statement for this year. I haven't very many, but I will leave them with the Secretary. All the information is perfectly open, and you are perfectly welcome to take it. It is a fact that these plants are operating under more economies than they would under ordinary cases, from the fact that there are three plants operating together, which is quite an element of economy; also, as the gentleman remarks, it is not a fair test on account of the officers having continued in office through the entire term of ten years, and that is very fortunate. I mentioned that in my paper. It has been extremely fortunate for the town that this has been so, and also it has been fortunate that we have had exceptionally able men at the head of the board, as many of you know. I also called attention to the fact that the business is practically the same, whether conducted by a municipality or by a private company, and that the same difficulties have to be met with, and people will not be satisfied. People want to get a good deal for their money, whether it is from a municipality or whether from a private company. I agree with Mr. Britton in this, that there is a reaction taking place toward municipal ownership, and particularly as regards gas and electric lighting plants. I think that there is no probability of any great progress in municipal ownership in that line for a long time to come.

Mr. Berkley: How do you arrange for renewals and extensions? Do you have a sinking fund upon which you can draw for that?

Mr. Moore: All the collections are turned over to the general fund, and so far that has been able to carry everything, and unless something very onlooked for comes up, and by being careful and using the funds for certain purposes, they should be able to provide for extensions.

Mr. Berkley: Do you charge anything for depreciation in the profit and loss account?

Mr. Moore: No. I find that in looking over the clerk's statement he has not included anything for depreciation, which I think should be done. He has allowed interest for the full value of the plant, which is not always done in municipally owned plants.

Mr. Lowe: I am very familiar with the situation at Santa Clara, and from my observations I can say that the operation of the municipal plant is very much the same as though it were privately owned. Business men are fortunately in charge of the politics of Santa Clara, and the same ones have been retained in office for a great many years, and the water, gas and electric light plants are handled as they would handle their own business. The town has been very fortunate in that respect. They recognize the fact as well that it is unfair to privately owned companies to claim results which they have not acquired in practice, and they have published their statements fully, comprehensively and fairly. It is the only instance within my knowledge where a municipality has stated the case exactly as it exists.

Mr. Kuster: One point I think it would be well to mention is that the gas to these consumers is measured through the same kind of meters that all of us use, and they are expected to pay their bills. I have been amused in listening to different voters express themselves. They seem to think that the gas should be delivered to their houses free of cost to them; that the town should pay for it; that it should come out of the general taxes. A great many people seem to have that impression that are advocates of municipal ownership.

Mr. Lowe: I think this is one of the instances where we should offer a vote of thanks to Mr. Moore. As I said before, it is very infrequent indeed in the history of the gas business that we are enabled, not only enabled but glad, to welcome on the floor of a convention a municipal ownership man. (Motion carried.)

Acting President Miller: I will state before proceeding with the next paper that the Committee on Awarding the Association Medal will be expected to report at the banquet this evening. We will now listen to a paper on the "Utilization of Gas Engines for Power Purposes," by Mr. Aue.

Published in Issue of September 29th

Acting President Miller: We will now listen to a paper by Mr. S. P. Hamilton, "Best Method of Promoting Gas Sales."

Published ih Issue of September 29th

Acting President Miller: Gentlemen, you have heard a very interesting paper. I should like to hear from Mr. Pearson on the subject.

Mr. Pearson: I think Mr. Hamilton's paper would hardly be applicable to the smaller districts. The Edison Electric

Company have a number of small plants covering Southern California, and necessarily our methods vary with the local conditions. In some places we have turned the business over to the local dealers, as stated in the paper by Mr. Cline, and in other places we have found that it is absolutely necessary to handle the business ourselves, and along the lines of the paper just read. We are pursuing a similar policy in competitive territory, and I believe that it is a pretty good policy to use, if the company wants to acquire all the business in the territory. The appliance business should be pushed to the limit, solicitation should be taken up to the utmost, and your service should be advertised on all circulars and bills, and the trouble man should always be on tap. I believe in the smaller towns, especially in California, where we are drifting very fast toward municipal ownership, that it is up to the corporations to push their business, and handle every branch of it, in order to increase the sales of gas, and to see that the best possible appliances are put in the houses.

Mr. Lowe: Here is a paper of particular value. I think it is the most comprehensive thing I have ever heard on the subject, and I move that a vote of thanks be extended to Mr. Hamilton.

Mr. Jones: In seconding that motion, I would like to say in justice to Mr. Hamilton, though it may not be generally known, of the splendid work he performed immediately after the earthquake. He was on tap the moment the earthquake took place, with the full knowledge that it was up to him to put gas stoves in San Francisco, and he personally took charge of it, and went ahead, and the enormous business done following the earthquake is practically due to his hard work. To be sure, he had excellent help, and an efficient crew of men under him, but he had the fearlessness and the knowledge to go into that breach and give the people of San Francisco what they most needed. (Motion carried.)

Mr. Rix: I would like to add a little something to what has been said, that industrial gas and demonstrating are two of the important elements in Mr. Hamilton's paper. What is the matter with joining these two together? Now, I do not know where to go to see gas furnaces in operation or to get any practical experience on the subject. We are installing one today, a small one, using about 200 feet per hour, for the purpose of case hardening steel. I had to take a chance in ordering it from the American Gas Furnace Company, not having any experience. I believe that there is more economy in using gas than in building up a coal fire for case hardening steel, but it would strike me that inasmuch as San Francisco is to be rehabilitated in its mechanical interests, that a great many will take advantage of gas for fuel, and that there should be some kind of an exhibition where a man could get ideas on the sort of a furnace to order.

Acting President Miller: The Pacific Gas Improvement Company undertook to install any kind of apparatus required. We were the first to install a coffee roaster using 150,000 to 200,000 feet of gas per month. This gas furnace was used for many years by the company.

Mr. Britton: I think Mr. Hamilton could give you offhand a list of the large consumers we have of industrial gas.

Mr. Hamilton: We have quite a great many large consumers. The largest, I presume, are the canneries, the fruit canneries, and next are the restaurants and hotels around town, where we have been spending our hardest efforts since the fire.

Mr. Lowe: I would like to ask Mr. Hamilton with what success he met in introducing gas for use as fuel in hotels.

Mr. Hamilton: There are not many large hotels in town now, but we have all of the restaurants using gas. We have gas for fuel in the Jefferson hotel and bakers' ovens in several other places, and we have regular restaurant ranges, broilers, etc., in the smaller restaurants.

Mr. Britton: As a sample of industrial gas, Mr. Grover might tell you of a line that we have just laid from Berkeley to Point Richmond for the purpose of supplying under long contract gas for the can factory of the Standard Oil Company in the face of the fact that they had their own oil there and could make their own gas, and yet we are under contract for five years to supply them gas for making their own cans.

Mr. Grover: I hardly know what to say in connection with the size of the installation. Of course, most of my work has been in connection with laying the line, but I have been through the can factory many times, and one of the things that they are going to use the gas for is melting the lead for soldering the cans together. They have large soldering tables along the entire sides of the building on the second floor, and the burners are placed the full length of the tables. In addition to this, they have machines for soldering the small tops on the cans after everything else is completed.

Mr. Britton: I have been told by the Standard Oil people that they contemplate using in the plant, when it is finished, approximately 200,000 cubic feet of gas per day, and that inside of six months they would double that capacity, and that they confidently expect to take 500,000 cubic feet per day inside of one year. That is one good customer.

Mr. Lowe: I regret very much indeed to say that we will scarcely have time to read the paper by the Editor of the Novelty Department, but it will be published in the proceedings. It is now after 5 o'clock and we will have to adjourn. These remarks also apply to the paper prepared by Mr. George P. Low, historian, which will also be published in the proceedings. Before the adjournment I will make the appointments for editors as follows:

Experience—R. P. Valentine.
Novelty—G. H. Hollidge.
Wrinkle—Geo. S. Colquhoun.
Historian—George P. Low.

Secretary—Mr. J. S. Kaneen has made a donation to the Association of an original set of King's Treatise on Coal Gas, one of the most valuable books in our library. It also may interest the members of the Association to know that the gavel of the Association was the only thing preserved of its effects. It happened to be in the safe in my office and was thus saved from the fire. It was the only thing belonging to the Association that was saved. It is particularly interesting in view of the fact that there is placed upon it the first badge ever made for the Association, and was put there by Mr. Jones.

Mr. Lowe: I will now hear the report of the Committee on the President's Address.

REPORT OF COMMITTEE ON ADDRESS OF PRESIDENT.

To the Officers and Members of the Pacific Coast Gas Association:

Your Committee on the Address of the President beg to make the following report:

It is with a great deal of regret that we note the absence of our genial President, and the committee feels that it would be fitting to send Mr. Martin a greeting from the Association, deploring his absence, and wish him a speedy and happy return to our beloved San Francisco.

The committee wish to report that the address, while short and to the point, is found to be full of good thoughts for the members of our Association. We call your attention to the paragraph in which he asks the Association's commendation for the members who took part in the rehabilitation of the different gas works after the late calamity. This praise or commendation should take some permanent form, so that future generations may know who the men were who shared in this work, and as far as possible, what the work was.

We think it proper to call attention to the paragraph in Mr. Martin's address referring to the small damage done by the earthquake, and feel that the Pacific Coast Gas Association should emphasize this for the benefit of the gas fraternity at large.

We trust that the members of the Association will pay heed to the invitation extended and the opportunity offered to visit the gas engine installation at Martin Station, a visit that your committee feels will amply repay the time necessary for its consummation, and as transportation will be furnished by the California Gas & Electric Corporation, every member should avail himself of this opportunity.

We call particular attention to the paragraph in which Mr. Martin asks every member of the Association to have something to say in the meetings of the Association, and suggest following out this line of thought, and if necessary to bring this about, the Chairman to call upon members who have not spoken for their opinion on questions that arise, to the end that the "rank and file" of our Association may, in accordance with the President's suggestion, assist in carrying on the meeting.

Your committee again desires to state that we feel it is with a great deal of reluctance on Mr. Martin's part that he is unable to be with us, but not more so than the regret on the part of the members of the Association, individually and collectively.

We have for years been expecting, and have always found him at the meeting taking an active part, and when he finally became President over our deliberations he was compelled to forego the pleasure as a matter of personal sorrow to him, and regret and loss to us.

F. H. EICHBAUM,
R. H. STERLING,
B. PEDERSEN.

San Francisco, Cal., September 19, 1906.

On motion, duly seconded, the report was unanimously adopted.

To the President and Members of the Pacific Coast Gas Association:

Gentlemen—Your Nominating Committee begs to report with the following recommendations:

For President, Jno. Martin of San Francisco.

Vice-President, C. O. G. Miller of San Francisco.

Secretary and Treasurer, John A. Britton of San Francisco.

Directors, Wm. Baurhyte, Los Angeles; John S. Kaneen, San Rafael; Van E. Britton, Santa Cruz; Edward A. Rix, San Francisco.

Your committee also recommends that the Secretary be empowered to employ an assistant, at a compensation to be fixed by him and to be paid out of the treasury of the Association.

Respectfully submitted,
E. C. JONES,
W. B CLINE,
W. F. BOARDMAN.

On motion, duly seconded, the men nominated to fill the offices of the Association for the ensuing year were unanimously elected.

The meeting was then adjourned to meet again at the banquet and at the outing tomorrow.

Adjourned.

REPORT OF COMMITTEE ON AWARDING MEDAL TO THE WRITER OF THE BEST PAPER.

Gentlemen of the Pacific Coast Gas Association:

We, your committee appointed to consider the awarding of the gold medal to the person presenting and reading a paper containing the most general merit, have decided after due deliberation that the gas fraternity throughout the country will read with interest the recital of the facts presented and circumstances that confronted the engineering head of the Gas Department of the California Gas & Electric Corporation in San Francisco on the morning of April 18, 1906. In that unprecedented chaos, incident to and accompanying this affliction of earthquake and fire, on this very unfortunate occasion, the systematic head that grasped such a situation and overcame the mechanical difficulties presented under such trying circumstances is certainly far out of the ordinary, with shattered mains, disjoined pipes in different sections of the city, depleted gas holders, ramifications of service, systems of mains to be considered, controlled and corrected (relics of enterprises of former promotors in the gas business); to control, and engage, the number of men, many of them sustaining serious individual inconveniences, of providing shelter and provider for those depending upon them consequent upon this disaster; to divide the city into sections; to close and plug, to prove and inspect the unburned portion, all of which has been presented in such a comprehensive and concise form that it will be accepted and passed into the annals of gas history as among the greatest of engineering feats in ancient or modern times—considering the great destruction manifest and the short period of the rehabilitation of this most unfortunate but enterprising municipality, in our judgment we award this medal to our respected friend and confrere, Edward Campbell Jones.

Respectfully yours,
T. R. PARKER,
R. H. STERLING,
F. E. FITZPATRICK,
Committee.

Acting President Miller: Gentlemen, it gives me a great deal of pleasure to put to you the question of whether the report of the committee shall be adopted and the medal awarded to Mr. E. C. Jones. (Motion carried.)

Mr. Jones: I thank you from the bottom of my heart for this honor. I did not expect it. I do not think the paper deserved it. In preparing the paper I did so at the request of friends in order that the work done after the earthquake might be a matter of record, and not with any intention of competing for a medal. I thank you very much.

The annual banquet of the Association was held at 6:30 p. m., immediately following the adjournment of the regular session. Mr. C. O. G. Miller acted as toastmaster, and in the course of the banquet, as evidencing the abiding faith of the Pacific Coast members in the rehabiliment of San Francisco, and in response to the invitation of the toastmaster, the following remarks were made:

Professor Cory: Members and Guests of the Pacific Coast Gas Association—For a good many years I was under the impression that I was perhaps more nearly identified with the electric than with the gas interests of the Pacific Coast, but I can assure you that within recent years, and particularly since attending the various meetings of this convention, I feel that I am in many ways as much interested, and I hope identified, with the manufacture of gas as with the generation and transmission of electrical energy. Yesterday we were told in this convention by the President that this was not an electrical convention. Nevertheless, it is true that there are a great many similarities when we carefully consider the manufacture and sale of electricity and gas. It was not very long ago that we distributed electrical energy at what is now known as a very low pressure. As the business developed it was found necessary to increase the pressure in order to economically transmit electrical energy long distances. Quite the same thing has been true in the development of the gas industry.

Again, originally, lighting companies were known as electric light companies and gas light companies. In a very short time there were created electric light and power companies, the electric power development having come after the utilization of electricity for illumination purposes. In my opinion it will not be long before the gas interests will find it necessary to add to their present field of activity just as the electric companies found it necessary to do, inasmuch

as gas will be used for a great many more purposes than the somewhat narrow field of lighting and heating for domestic purposes. Gas will be used for the generation of power and it will also be used in many lines of manufacture in the course of development at the present time. Gas, of course, has been used for fuel for many years, and one is necessarily impressed with the development not only in the modern gas light appliances but in other apparatus for the use of gas for general purposes, and it will be but a short time until the utilization of gas for manufacturing purposes will be greatly increased both for fuel in large quantities and as a source of power.

The Pacific Coast, and particularly San Francisco, is at the present time being wtached most carefully by our Eastern friends. I happened to be in one of our largest Eastern cities a few months ago and while there met a number of men who had been in San Francisco and enjoyed the boundless hospitality for which this city is justly famous. In talking with them regarding the present situation and hearing from them their unanimous admiration of the grit and determination being shown by San Francisco under the present trying circumstances, they seemed anxious to get all the information possible regarding the probable future outcome and rebuilding of the city. Their skepticism was undisguised, and one of them said:

"Now, Mr. Cory, we, of course, hear a great deal about the rapid reconstruction now going on, but tell us the exact truth, is San Francisco ever going to be again a great city? We note that the bank clearings are uniformly larger than last year, but is it not due to temporary conditions? Really, down deep, what is to be the future of San Francisco?"

My reply was that before April 18th there were a great many people in San Francisco who did not need to work as they had such large incomes that it was not necessary for them to live the strenuous life, but since the earthquake, everything having been lost, we were all as busy as possible, working to rebuild the city, and that if our Eastern friends were not very careful, the result of the combined efforts of the San Francisco people and its Pacific Coast supporters would be the development on this side of the continent of a commonwealth which would put the old and conservative East in the background.

It seems to me that just such meetings as this convention of the Pacific Coast Gas Association, and particularly this banquet, are responsible for the bringing together of all who are interested in the reconstruction of the city, and particularly the rehabilitation of the public service corporations. There is for each man a particular field of work. Some have the task of raising the necessary money to rebuild the destroyed plants and accessory systems; others must give their best efforts to directing the reconstruction, and finally, and by far the greater number must actually do the labor that is necessary to recover our former position.

This meeting and all of its kind brings together these different types of men, and as a result we must naturally get that unity of action and the thorough understanding of the different work which each has to do which is of great advantage to all. Just at this time in San Francisco the meeting of the Gas Association is not only of great benefit to the gas industry, but is also of importance in a much wider sense, inasmuch as it brings together interests, no matter what their relation may be, and indicates most clearly that it is necessary for us to loyally support one another, no matter what the work is we may individually have in hand.

Mr. Lowe: I want to call your attention to the organization in the East of the Gas Institute. It is composed of the old American Gas Light Association and two or three other organizations. Had it not been for the great consolidation and the consolidation of the gas interests in the East that would not have taken place. I do not regard it as a good omen. I think it would be very much better for the Association to preserve its individuality and grow by themselves. Ever since the organization of the United Gas Improvement Company, ever since the absorption of numerous properties, the American Gas Light Association has ceased to retain its individuality and has become really an adjunct to the United Gas Improvement Company, so much so that the leading men of the United Gas Improvement Company were always the officers of the Association. Those identified with the work lost their voices, the rank and file were afraid to speak for themselves. Little by little the Association has advanced until we of the Pacific Coast have prided ourselves on our originality. We are independent, we feel that we amount to something. Don't let us make the same mistake. The gas business of the Pacific Coast is being centralized. The California Gas & Electric Corporation, with its numerous subsidiary companies, the San Francisco Gas & Electric Company and other companies have gone into the Pacific Gas & Electric Company. In the South, the Los Angeles Gas & Electric Company have absorbed about everything there. Don't allow that, however, to be the cause of the same error that has occurred in the East, for little by little you will find that you will have no use for this Association, and we will try to save our miserable existence by drifting into the Gas Institute. It must not be. There is not a man at the head of this great consolidation who desires in the least to do it. Lift up your voices, have something to say. If you want to know anything, you must get on your feet and ask. Do not be afraid of making errors. The men who employ you will be very much prouder of you, and will see something good in you if you are able to correct your errors than not, and I think that you will find they do not know it all.

Mr. E. C. Moore: It might be supposed that, representing a municipal plant, and finding myself here in the midst of a lot of corporation men, I might think that I was in the wrong place, but I assure you that is not the case. I have been very well pleased with my environment, and the only reason which I make for that is found in this, that for several years I have had some acquaintance with several of the representative men here, and know of their kindness of heart and their charity for those who do things from a standpoint somewhat different from their own. Another reason may be found in the fact that although for the past ten years I have been brought to a great extent in contact with municipal things, yet much more of my life has been spent in the service of corporations, and although I know something of the troubles of municipal things, I also realize something of the troubles of corporations. Since I have been with both of them, and they are somewhat in conflict, I want to say a word about the relation between these two. In my work for municipalities I have had in the last ten years in California to make the acquaintance of a great many of the members of governing bodies. I suppose that I have made the acquaintance of at least 100 men who are representing municipalities, sanitary districts, etc., on various sorts of business dealings. On the other hand, as I have told you, a great deal more of my life has been spent in the service of corporations and in making the acquaintance of representative men in them. Now we hear a great deal about graft on the one hand and about greed and selfishness on the other, and I want to say, from my experience on both sides, that this, in my belief, is unfounded. And I want also to say from my experience with both classes that I am an optimist. I want to say that in my experience in dealing with municipal bodies that nine-tenths, in my opinion, of all the men with whom I have come in contact, are honest and earnest and doing the best they could so far as they knew. I think I could name on the fingers of one hand all those members that I think were actuated by other motives. Also as regards the representative men in corporations, when it comes to corporations of consequence, I must say that I do not recall any who have been other than square, honorable men.

Mr. Berkley: I want to add a word about what Mr. Lowe has said about the Gas Institute. I have been for years a member of the Western Gas Association, and I want you to take seriously what Mr. Lowe has said about the absorption and the loss of individuality through the changes that are going on in the Middle West and the East. It is a sad thing to have to say that the Western Gas Association and the Ohio Gas Association and the American Gas Association have died a death, caused by the conditions which he named. Now. I am sure, gentlemen, if you will stop and think this over before you seriously consider your affiliation with this one organiaztion you will first discover that your location would bar you from active participation in its sessions, and in the second place, those only of our Association here who could attend that Gas Institute must bear in mind that they will never come west of the Rockies to hold their sessions. Do not forget that. They will keep it East, that those few of you who might go there will be so in the minority that your identity would be a positive and absolute loss.

On the floor of the convention in St. Louis Mr. Doherty advanced this idea. Last year in Chicago he came there, with the assistance of Donald McDonald, with the determination to launch the question at the last convention meeting, and carry it by storm, but a few of us stopped that plan. The honorable Secretary of the Association, James Dunbar, a man of sterling quality, and of undying faith in the gas fraternity, and especially the Western Gas Association, did all it was and especially the Western Gas Association, did all it was possible for him to do to stop this tide, but failed at the last convention held in Cleveland. Now, mark it, that just as sure as this organization will be made a permanent one, that the identity of the three organizations that pass into this one Gas Institute will be so entirely lost that in five years' time they will not be able to find at that Association meeting one-half of the number of men that are here tonight. Now, that may look a little bit far-fetched. I am a Middle West man by birth, I love that part of the country, but I love the gas fraternity better. I beg of you to consider that question well, and do not let it absorb you with the idea that it is going to be a protector and a producer. I asked Mr. Doherty at St. Louis where the small man would be upon joining their Association. We knew they would not be there long, but the plan of the Gas Institute precludes that man, and there is no opportunity for him to go into the convention. I have, however, permitted myself to become a charter member of the Association. I thought I would see the thing one stage of the way, but since I have come here and identified myself and cast my lot with this Association—I am not saying this now because I have severed my relation (I would not have you think that at all) with that part of the country, but I want you to know that I am speaking from experience, and that I am speaking from what I know of the men, the motive and the cause that started it, and I want to tell you that for the man who will really become the coming gas man it is vicious. That is rather a broad term, but it is a fact, for it will positively keep out the man who is drawing a salary of from $75 to $100 per month, and they are the men who will, after a while, draw the larger salaries.

Permit me to say in closing that of all the meetings I have attended of the Association with which I have been identified, I have not seen one concerted action or interest on the part of the men as during these two days of this convention that we have had here. The last meeting that we held in Chicago a year ago we could not get a quorum on the second day to start the session off, but here every man, almost to a man, has been right here on the spot, which shows that the West is made up of the best brain and brawn that comes from the East and Middle West, and that we are out here for the express purpose of getting there, and when San Francisco is rebuilt, which will certainly be done, the men of the East and Middle West will wake up to the fact that their brethren out here are going ahead, and I am here to say that in all of our correspondence back to that country that we are telling the glad news to the people of this country that they have the indomitable will and perseverance and manliness of character that earthquakes and fires cannot overcome.

Mr. Britton: Mr. Chairman and Gentlemen of the Association—I am going to tell you a little story. On a very bright, beautiful spring day there sailed out of the Golden Gate one of the Leviathans of the deep, heavily laden with a cargo and passengers bound for the Orient. On the deck of that ship was one man who, as it wended its way over the smooth waters of the bay, looked back at the hills of San Francisco and wondered when he would see them again. They certainly looked beautiful in the sunshine. The skyline was as attractive as ever. The hills on the eastward slope were green. The bay was a beautiful blue. The Golden Gate disappeared and mid-ocean came, as Joaquin Miller expresses it poetically, "There was nothing but the blue, blue deep, and the deep, deep blue." We stopped for a while at the Island of Hawaii, gliding safely in among the coral reefs of that beautiful harbor, and spent a day in admiring the beauties of the island and the softness of its air and the beauty of its women, and then we sailed on across the great big ocean, with land, as the captain expressed it, no nearer than one mile, and that one mile below the keel of the ship. We crossed the meridian on the 17th day of April. On the morning of the 18th, or the 19th it was, the passenger met the captain on the hurricane deck as he came down from the bridge and, after passing the usual salutations, inquired how he felt. He replied that he felt like ——, and the passenger said "Why?" "I had no sleep last night, I could not sleep. I was very much disturbed. This morning about 4 o'clock I turned in again, after going up on the bridge, and about 5, or a few minutes afterward, I had a frightful dream, a nightmare, and when I awakened from the dream I found myself on the floor of the cabin. I have been distressed about the dream ever since." The passenger said: "What was it?" "I dreamed that San Francisco was destroyed by an earthquake." Of course, we laughed at him and joked about it, but I made a memorandum of his statement in a diary that I was keeping of the trip. Six days afterward, on the 24th of April, we sighted the coast of Japan, a beautiful coast, green as the hills of California are in the winter time. We sailed in through that beautiful harbor, after a beautiful voyage of eighteen days across the grand Pacific, and were met with the news. Meager news it was, news that could offer nothing to our minds but anxiety, and nothing clear was learned until about ten days afterwards. You can imagine that the passengers on board that ship who had gone from here but a few days before could do nothing but wonder. Subsequently the whole story was arrived at, and then we started on our homeward voyage. The voyage, like ourselves, was devoid of merriment. It seemed to be that even the clouds were somber, fogs followed us, rough winds and high seas beat upon us all the way back, until one beautiful Sunday morning, very much like the day we sailed out, we came in through the Golden Gate. On our way out, there followed us, in a tug, crowds of our friends, shouting as long as they could their good-byes, and on our return the first thing that greeted us was the same tug, with the same friends, with banners flying and with music playing, shouting salutations out over the water. We could see nothing with our eyes dimmed with tears but the skyline beyond. Still we wondered that Sunday all the time what had been done, what was doing. We had confidence in the people here, but still the wonderment was there.

The other day I had occasion to go up into the Sierra Nevadas. I was away up on the summit of the Sierras, where the eternal snows are, up among the rivers that flow pure water, across places where the foot of man had never trod, but evidences were there of men before, and I thought as I lay out under the stars of night of the men who had come across from the eastern shores in the old days, across the plains, fought men and beasts, climbed the mountains and left their

footprints on the Rockies, who made the pathways over which I trod, through Herculean forests, through places where even the deer would come up to shy away and look at you with absolute unfear. I saw the evidences of the work that those men did in those days when huge mountains were tumbled down and cast into the waters. I thought of their determination, their prowess and their power, and then to me, no longer was there any wonderment. I knew that that same class of men, with that same indomitable spirit and energy that crossed those mountains, that conquered California, that built it up, that lived through the Argonaut days, were the same men in spirit; that they of today had that same vitality, that same energy, that same determination of character, as the men they left behind them here in California, and that the spirit of '49 was the spirit of '06. That is what has builded up your city, that is what has made it possible for California today, San Francisco in particular, to hold up its head and say to the world, We need no help, we need no sympathy, we need no tears; we are strong, not only in brain, but in arm, in purpose and intent, and we are going to build upon the ruins of San Francisco a city which will eclipse any other in the world. That same spirit, that same ideal spirit, dominating the men of our profession in those dark days that followed. The credit is not due so much to the men who directed as it is to the men who performed it. I am enough of a disciplinarian to know that men must have a leader, but a body of men with a leader, unless they have in themselves much of the same spirit of the leader, cannot accomplish anything, and the men of tireless energy, the men who knew not day, who knew not night hours, and who cared not even for food or sustenance, but who simply saw ahead of them that one word "Duty," and performed that duty as they thought best, those are the men that we should give the credit to, and the city today would not be in the condition it is, fit to live in, practically rehabilitated, so far as the necessities of life are concerned, outside of the burned district, practically as perfect a city as it was before the fire, doing more trade, spending more money for the necessities of life, and catering to as many people, without such men. If these same men had not done that which they were told to do, and did it cheerfully, and, as results prove, well, these things could not be, and I want, as I said today once before, I want that spirit that I am trying to give you to hold. I want the men of the Eastern states, when they read our proceedings, to know that the men of California today are not doubting, but that they are fearless, that they are ready to go through the same hardships, endure the same toils, for the accomplishment of the same end that their forefathers did before them.

JOBBING HOUSES OF LOS ANGELES.

The California Electric Co. of Los Angeles are distributing a very handsome little booklet which they have issued devoted to the jobbing interests of Los Angeles and including numerous half-tone pictures of the buildings occupied by the various jobbers of their city.

It is a very handsome little production and gives outsiders some idea of the magnitude of the jobbing business in that section and the amount of space devoted to it.

The California Electric Co. will be very glad to furnish copies on request addressed to them at Nos. 117-119 East Seventh street, Los Angeles.

WESTERN ELECTRIC CO., SEATTLE.

The Western Electric Co. have just let the contract for a handsome five-story warehouse building on First Avenue South, Seattle, Wash., which, under the contract, will be ready for occupancy in about 60 days. Ample floor space and a side track at the rear shipping platform will enable them to maintain the reputation for service which that company has established throughout the country generally.

TO CONSULTING ENGINEERS, ELECTRICAL CONTRACTORS AND DEALERS.

The recent disaster which has overtaken San Francisco and vicinity destroyed, for the most part, the catalogue files of a great number of consulting engineers, electrical dealers and contractors.

The San Francisco office of the Wagner Electric Mfg. Co., recognizing this fact, is requesting all consulting engineers, electrical contractors and dealers to write them, advising of their new office address, so that they may be put on the mailing list of the Wagner Co. for new bulletins and such literature issued by that company. The Wagner Co. will appreciate the opportunity of sending their current bulletins to all those whose files are incomplete.

ELECTRICAL CONTRACTORS' ASSOCIATION.

The third annual banquet of the Electrical Contractors' Association of the Pacific Coast was held at "Jules" new restaurant on Bush street between Montgomery and Kearny streets on Saturday evening, September 29th. One hundred members and guests were in attendance and a most enjoyable and profitable evening resulted. The jobbers and the contractors discussed the problem of delayed deliveries from the East and also many other important questions of great interest at the present time. The banquet was splendidly served and the entertainers of the evening were a great success.

The officers of the association are: Robert W. Martland, president; Geo. K. Porter, vice-president; C. E. Wiggin, treasurer, and F. V. Meyers, secretary.

The banquet committee consisted of A. E. Rundell, Louis Levy and C. S. S. Forney. Mr. Geo. K. Porter acted as toastmaster.

San Francisco, Cal.—Mayor Schmitz has filed with the Board of Supervisors a communication recommending the construction of an overhead trolley system on Geary street.

San Francisco, Cal.—It has been announced by the United Railroads that work would be rushed on Larkin street with a view of operating a cross-town line from Market to Sutter streets as soon as possible. The line will be continued later on, but it is hoped to have it running between the two designated streets within two or three weeks.

Napa, Cal.—Manager Perry of the San Francisco, Vallejo, and Napa Railroad Company has been granted the power to make contracts for the car and electrical equipment.

Oakland, Cal.—What threatened to be a dangerous blaze was discovered on September 11th among the rafters of the generating plant of the Oakland Gas Light & Heat Company at First and Market streets. The fire department was called out and with much difficulty extinguished the blaze. The fire was particularly dangerous because of its proximity to large quantities of illuminating gas.

Ukiah, Cal.—The recent earthquake nearly wrecked the foundations of the boilers at the local municipal electric light plant and the damage was not discovered until recently when a portion of the masonry fell in. When an attempt was made to repair the damage it was found that the foundations would have to be rebuilt.

Sacramento, Cal.—At the last meeting of the Trustees for the franchise for the Seventh and T street railway line the Sacramento Gas and Electric Railway Company bid 2 per cent on gross earnings yearly, after five years. The bid was accepted and the franchise awarded to the bidder, no other bids being made.

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EDITORIAL.

NEW APPLICATIONS FOR ELECTRICITY

Although there may be some difficulties yet to be overcome, the present field of the commercial utilization of electrical energy will in the future undoubtedly be much enlarged. At the present time, electricity is used for power, lighting, heating to a very limited extent, and for a few other purposes, most of which are in some way directly or indirectly allied to those above mentioned. It is perhaps the cost of producing electric power which will always determine the extent to which electricity may be used for any purpose. In order to analyze the situation, it is perhaps as well to first consider all the sources from which electricity may be generated.

These sources are four in number. First, directly from mechanical energy. This method, while of little practical value, is the oldest known. The electrification of a glass or rubber rod by mechanical friction with silk or cat's fur is familiar to all. The old textbooks on electricity seemingly dwelt to an unnecessary extent upon this method of generation, or the production of the so-called static electricity.

The second source is by directly converting heat or thermal energy into electrical energy. While the conversion of electrical energy into heat is most easy and highly efficient, the reverse transformation has as yet never been commercially accomplished. Electricity may be generated directly from heat with a thermopile by utilizing the differences of potential between the junctions of dis-similar metals, but in very minute quantities.

The third source of electrical energy is from chemical potential energy, or the chemical change which results under proper physical and chemical conditions. The primary and secondary battery, the latter usually known as a storage battery, are almost the only practical devices coming under this class. It should, of course, be borne in mind that the storage battery is not a device for storing electricity, but rather operates upon the principle that by the use of direct current a chemical change is brought about in the battery which when reversed will give out electrical energy, the entire process being accomplished at a comparatively high efficiency. The primary battery, on the other hand, is a direct source of electrical energy, and except for the large cost of the necessary materials and crude construction of such batteries, electrical energy to a great extent might be practically generated by such chemical reactions.

The fourth, and by far the most important source of electrical energy, is from mechanical energy through the utilization of magnetic devices. The dynamo is for both alternating current and direct current, the only apparatus of great practical and commercial importance in the generation of electricity. Aud further, it is quite probable that for a long time to come the production of electrical energy by the last of these four processes will be the cheapest and most reliable.

Coming then to the cost of electrical energy, it is but a matter of the cost of mechanical energy. As far as electrical power development is concerned at the present time, the mechanical energy necessary for the production of electric power is developed from two sources, i. e., fuel, such as coal, oil, wood, etc., and water power. The cost per kilowatt hour of electrical energy depends therefore upon the cost of fuel or water power.

Considering the cost of fuel first, it is perhaps as well to discuss the use of fuel oil. At a cost of 85 cents per barrel for oil at the generating plant, using the most economical boilers, engines or turbines and dynamos in large units, the cost per kilowatt hour for the fuel alone would be approximately one-half cent. If the cost of fuel should be cut in half, due to reduced cost of oil transportation, a kilowatt hour may be generated for one-fourth of a cent. Directly at the wells the cost of oil is probably about 20 to 25 cents, which would mean a cost per kilowatt hour for fuel, with the generating station located at the oil wells, of one-eighth of a cent per kilowatt hour.

In a water power plant the corresponding cost of the generation of electric power is largely represented by the interest on the investment in the apparatus and hydraulic development necessary to produce such electrical energy. For convenience, let us assume that the cost of the plant is $100 per kilowatt capacity. For 24-hour service every day in the year, one kilowatt would represent about 8,700 kilowatt hours, and assuming 6 per cent as a reasonable interest charge on the investment, this would amount to $6 per year per kilowatt output, or a cost per kilowatt hour of about 7-100ths

of a cent. Of course, in most commercial water-driven electric power plants the cost of the installation per kilowatt capacity is greater than $100. Assuming it to be twice this amount, or $200, the interest charge would then make the cost of every kilowatt hour 14-100ths of a cent.

It must, of course, be remembered that the cost of generation is but a fraction of the total cost of electrical energy as delivered to the consumer, and it also often happens, taking all things into consideration, one important point being the load factor, that a steam plant is more economical than a water-power plant.

Except for very large quantities of electrical energy used in one place, it is safe to say that rarely is it possible to deliver to the consumer a kilowatt hour for less than one cent, and it is this figure, or some figure near this amount, which must be considered when electrical energy is used for any purpose whatsoever in large amounts.

For electrical illumination and for power, with all its incidental advantages, electricity has really no competitor. For heating, except where the heat may be concentrated and therefore made much more effective, the cost of electrical power is nearly always so great as to render it unavailable.

For the future, however, it is not too much to expect that the cost of generating electrical power may be materially reduced. The direct conversion of heat into electrical energy would certainly so reduce the cost of electricity that its field of usefulness would be much enlarged. Electrical engineers in general are always much interested when electricity is successfully used for some new purpose. A description of the plant of the Natural Food Company at Niagara Falls in another column indicates in a small way, perhaps, what may be expected in the near future along new and important lines of electrical application.

CONSUMPTION OF GAS IN VARIOUS CITIES.

According to data given by the "Progressive Age," the output of gas in Paris, France, in 1855 was 1,439,973,000 cubic feet, and in 1905 13,946,711,000 cubic feet, which would indicate an annual average increase of 250,000 cubic feet for 50 years, although the actual percentage increase over 1904 was 4 per cent, or 5.19 and 7.62 per cent for the two previous years due to the reduction in price, the average price now being $1.46. This means that Paris used about 5,000 cubic feet per inhabitant per year, as compared with 1,165 cubic feet in 1855, 3,800 cubic feet in 1889 and 4,400 cubic feet in 1900, and gives a fair idea of the increasing rate at which people are using gas. These figures, however, do not compare unfavorably with the United States cities, such as Philadelphia, 6,600; Baltimore, 4,769; Denver, 4,790; Cincinnati, 5,500; Detroit, 6,150, etc. Also note Birmingham, England, 8,300, or German cities such as Bremen, 8,530; Hanover, 8,400; Hamburg, 7,314; Munich, 3,528, etc. Some French statistics recently published declare that Lyons citizens used but 2,260 cubic feet per inhabitant; Marseilles, 1,940, and Bordeaux, 2,719; Glasgow, Scotland, uses 6,449 cubic feet; New York City uses about 6,800. Compare with this the Italian cities of Milan with 3,400; Turin, 3,000; Naples, 700; Rome, 1,660, and Venice, 970. All these cities have, or should have, progressive management and show how directly the quantity of gas used depends upon the price. Again, during about a decade the percentage increase per year of Italian cities has been: Milan, 8.9 per cent; Rome, 4.9 per cent; Naples and Turin, 1.4 per cent. In England: Sheffield, 5 per cent; Birmingham, 4.8 per cent; Manchester, 3.2 per cent; Edinburg, Scotland, 3.1 per cent, and Glasgow, 4.2 per cent. In the United States the growth is much more apparent: Philadelphia, 9.7 per cent; Denver, 12 per cent; St. Louis, 24.7 per cent; Detroit, 58 per cent; New Orleans, 13.3 per cent; Cincinnati, 7.6 per cent, and Baltimore, 5.2 per cent. The use of gas has increased particularly in the Central West.

BOOK REVIEWS.

Manual of Wireless Telegraphy. By A. Frederick Collins. 232 pp., 90 illustrations. John Wiley & Sons, Publishers, New York. Cloth, $1.50 net; Morocco, $2.00 net.

In the arrangement and choice of the material in this book the author has concerned himself entirely with those things which are of practical interest to the operator of a wireless station. Excepting a superficial discussion of the theoretical principles of wireless telegraphy, the book gives in detail a description of the instruments and apparatus which make up the equipment of a wireless telegraph station, with their adjustments and arrangement, and the various codes and systems employed. Thirty-four pages are devoted to wiring diagrams of transmitters and receptors. Illustrations which are generously used, are clear and well calculated to convey the desired information. The last chapter contains a great deal of information which is of interest to the general public, such as the cost of messages, the places from which they may be sent, the transatlantic liners with which communication is possible, etc., besides an extensive bibliography of the subject. The amateur as well as the practical operator will find this book a valuable aid for getting an intelligent idea of the construction and working of his apparatus.

Mr. E. W. Moore, president of the Electric Cable Co. of Bridgeport, Conn., has an excellent article in the September issue of System entitled "Starting a Manufacturing Business," in which he describes the general conditions which the prospective manufacturer must face in entering the field, particularly the manufacturer of electrical supplies. The article is illustrated by a full-page portrait of Mr. Moore and by an exterior and interior view of the Electric Cable Co.'s plant, showing the system observed in shipping products and the labor-saving machinery used in this connection.

TRADE CATALOGUES.

The General Electric Co. has just issued a 345-page order guide for electric lighting appliances. The catalogue is well illustrated and shows the various kinds of lamp sockets, receptacles, switches, fuses, cabinets, etc., manufactured by them.

FINANCIAL.

San Francisco, Cal.—John Martin, Frank Drumm, Cyrus Pierce, Frank B. Anderson, Eugene de Sabla, H. H. Taylor and Frank L. Brown, representing the great lighting and

A. L. Taylor, successor to Fair, Taylor & Co., and S. R. Church, formerly at 604 Montgomery street, has returned to San Francisco again from Oakland, where he has been located since the fire. He now may be found at No. 9 California street.

HISTORICAL NOTES.

(By George P. Low, Historian.)

The resolution which instituted an historian for the Pacific Coast Gas Association presumes the creation of an elective office to be filled from year to year, and the duties of the holder of which shall consist in recording events of general interest to the Association as they transpire, for in so doing there will be compiled and preserved an historical resume of enduring value. To collect such information, however, necessitates unreserved co-operation on the part of every member of the Association toward the historian—a co-operation which has thus far failed to be in evidence.

The year 1906 will ever be memorable in the history of the Golden State. Let us, then, complete the story of the past up to it, so far as it is possible to do, in the present contribution by rounding out the information already in hand and by bringing the history of the industry up to the momentous present year in order to make the pathway clear for the coming historian in his task of gathering for record coming events.

In presenting that which follows, therefore, your historian asks for indulgence toward any repetition which may appear. In particular does he bear in mind the thoroughness of the paper read by Mr. T. K. Parker before the meeting of 1904; but he believes that his duties would not be aright were he to fail to impart any information of which he may have become possessed in addition thereto.

FRESNO—Since their establishment in 1883 the Fresno gas works have occupied the intersection of Tulare and F streets, but, from a single coal gas bench and a 7,000-foot holder with one mile of street main and fifty consumers' meters, it has gone through many interesting states of development.

The Fresno Gas Co. was incorporated in 1883, and two years later the works had been increased to two benches of fives, with an output of about 25,000 cubic feet of gas per day in winter and, perhaps, 15,000 cubic feet in summer. Thenceforth it showed a yearly increase of approximately 12 per cent, the total output in 1889 averaging 24,400 cubic feet per day. Mr. N. O. Smith, its superintendent, was succeeded some months later by Mr. Danville Decker, who assumed charge of both the gas and the electric systems of the company. In 1891 Mr. Decker installed two Lowe water gas sets that had been bought second-hand from the Oakland Gas, Light & Heat Co. One of these sets had a capacity of 125,000 cubic feet, making 21 candle-power gas. Upon the completion of the water gas sets the manufacture of coal gas was discontinued.

The present plant consists of a Lowe crude oil set (erected in October, 1904,) 9 feet in diameter, with a capacity of 200,000 cubic feet per day of 20 hours, and a Jones oil gas set having an output of 800,000 cubic feet per day of 20 hours, the product being a 24-candle gas of excellent quality.

Originally the price of gas in Fresno was $5 per thousand, but in the winter of 1891-92 it was reduced to $4, then later, in 1892, it was reduced successively to $3.50 and to $2.50, but on January 1, 1893, the price was raised to $3.50 for illuminating gas.

At the outset, Wallend-Sydney and Greta coals, costing $13.50 per ton, with $4.90 added for freight, were used in coal gas making, and Australian shale costing in the neighborhood of $30 per ton delivered, was used for enriching. Service was initiated, as stated, with 50 meters; in the spring of 1886 about 450 meters were installed; ten years later the number of meters had been increased to over 700, while at present the list has reached a total of 1,400 meters.

No competing gas company ever entered Fresno, but in 1890, when Mr. Robert C. Barton of the Barton Vineyard Co. was building the Barton Opera House. Mr. A. E. Brooke-Ridley, then of the Edison General Electric Co., induced him to install an electric plant for lighting the opera house. This suggestion was duly carried out, and two 20 kilowatt Edison bipolar dynamos, steam driven, were installed; but after Mr. Barton's death in 1891 it was determined to enlarge the plant so as to engage in commercial lighting in opposition to the Fresno Gas & Electric Light Co., by which name the Fresno Gas Co. had become known through re-incorporation. Thereupon the Edison Electric Light & Power Co. of Fresno was organized and incorporated by several prominent citizens, among whom were Messrs. John M. Ryan, who was president of the company, Louis Einstein, Frank H. Sharp, Louis Gundelfinger, William Fahey and W. McCallum. Mr. Axel Gutsch was appointed manager of the new company.

Competition between the electric lighting plants of the Edison and Gas Companies was very keen for two years or so, when, in the fall of 1892, the Edison Electric Light & Power Co. was absorbed by the Fresno Gas & Electric Light Co.

It was during this time that freight on Santa Paula oil was $132 per carload from the Santa Paula fields to Fresno, while the freight on the same car of oil to San Francisco was but $62. The cost of coal was all but prohibitive, as it ran as high as $12 per long ton of Cardiff and $4.90 to be added for freight from San Francisco to Fresno—in fact, the records of the company show that during the four years from 1889 to 1892 inclusive, the Fresno Gas & Electric Light Co. paid the Southern Pacific Co. for freight on coal the very sizeable sum of $37,612.76. These figures show why the advent of electrically transmitted power made the successful operation of a steam-driven plant an impossibility in Fresno, and they also show why the price of $18 per month imposed for the 24 street arc lamps operated from the steam plant was not extortionate, regardless of the prices prevailing in other localities.

It is also interesting to note the condition of the gas business at that time. During this period of four years from 1889 to 1892 inclusive, the output and gross income, respectively, of the Fresno Gas & Electric Light Co. were as follows:

Year.	Output.	Gross income
1889	8,870,000 cubic feet	$34,079.40
1890	9,715,000 cubic feet	37,503.60
1891	10,358,000 cubic feet	39,783.75
1892	10,306,000 cubic feet	26,928.70

After the absorption of the Edison plant, the Fresno Gas & Electric Light Co. held undisputed sway until April, 1899, when the world-famed transmission line of the San Joaquin Electric Co. began transmitting power into Fresno from the south fork of the San Joaquin river, some 35 miles distant. This was then the longest distance transmission line in the world. Beyond this, it was a very notable engineering achievement in many respects; but despite the finesse of its engineering triumphs, its management failed to take due note of the many items constituting the fixed charges of expense in the conduct of a transmission plant, with the result that ruinously low rates were established—in some cases as low as 10 cents per 16 candle-power lamp per month—in the endeavor to drive the gas company out of the electric lighting business. Its campaign was one of destructive competition, waged with the ardor of inexperience. By virtue of its far lower bids, the San Joaquin Electric Co. took the contract for city lighting at the rate of $6.40 per lamp for eighty 2,000 candle-power street arc lamps, as well as practically all the commercial and residence lighting of the city, so that after a five months' war the gas company relinquished the electric lighting field to the transmission company, and a year later, during the period when Mr. Gutsch was again secretary and manager of the gas company, the San Joaquin Electric Co. was forced to go into the hands of a receiver. This retirement on the part of the gas company from the electric lighting and power fields in Fresno marked the close of what was probably the most bitter fight that ever occurred in California between a steam-driven electric plant and a power transmission plant. The advantages were primarily favorable to the transmission

interests, particularly because of the high price of fuel in Fresno and the comparative cheapness of transmitted power under a proper administration of the financial end of the business; but the gross mismanagement of the transmission plant, coupled with the exceeding popularity of gas as a fuel in Fresno, made the apparently ultimate success of the transmission company not an unqualified one, for the gas company did not retire from the electrical business in Fresno without its full meed of compensation.

MARYSVILLE—The original gas works of Marysville were located on the northwest corner of Second and B streets, in a brick building which is now the Marysville office of the Bay Counties Power Co. In the rear still stands in active service the original holder which came around the Horn and was erected in 1860. It is of riveted sheet iron, floating in an underground wooden tank, and is now out of use. In 1861 the length of main had increased to 14,500 feet. As to the price of coal, originally Wigand cannel cost $24 per ton; a coal brought from Chili cost $15 per ton, and Lesmahago cost $22 per ton. At the autset gas sold for $12 per thousand, but in 1861 it was reduced to $11, and in 1863 another reduction of $1 was made.

The gas works of this original plant consisted of two benches of fours with cast iron retorts—some of which, by the way, may today be seen on the streets of Marysville, where, half buried at street corners, they serve to protect the curbing from the wheels of passing vehicles. The original holder, already referred to, measured 40 feet in diameter by 16 feet in height, and had a capacity of approximately 20,000 cubic feet. In 1879 the business of the company had increased to an annual output of 12,300 cubic feet, which necessitated extensions that warranted an increase of the capital stock of the company from $50,000 to $100,000, which was done in the year named. Mr. D. E. Knight was then elected president, and from that time on until his death he was paramount in the administration of the company's affairs.

Competition from an electric lighting source sprung up in 1886, but no competition arose in the gas business until 1898, when the Yuba Power Co. (which afterward resulted in the organization of the Marysville Gas & Electric Co.) gave a contract for the installation of a water gas plant to the Western Gas Construction Co. of Ft. Wayne, Ind. The latter at once built one of its well-known single sets having a capacity of 3,000 cubic feet per hour. This plant was finished on the first day of October, 1898, and the two companies occupied the field until March 1, 1899, when the Marysville Gas & Electric Co. bought the entire plant, property and good will of the Marysville Coal Gas Co. Since then the Marysville Gas & Electric Co. has been the sole distributor of gas and electricity for all classes of service.

The Western Gas Construction Co.'s plant was superseded on September 1, 1901, by a Lowe crude oil set, which has a capacity of 90,000 cubic feet per 20-hour day. The works adjoin the sub-station of the Bay Counties Power Co., which are located near the levee on the north side of the street. Here an underground 285-barrel oil tank is installed and a 20,000-foot storage holder, resting in a wooden tank on the surface of the ground, was erected in 1898. In addition, a 20,000 cubic feet relief holder has recently been installed, as has also a 175,000 cubic feet Jones oil gas machine.

After the consolidation of the original companies, Marysville showed an extraordinary increase in the consumption of gas for fuel purposes. In 1896 there were but six oppliances in Marysville for the use of gas as fuel; in 1899 there were 140 such appliances, and in the spring of 1902 there were over 300 gas stoves alone in use, while 70 per cent of the output of the works is in fuel gas. A more striking instance in illustration of the possibilities of development in the consumption of fuel gas cannot be cited in all the country. True, Marysville possesses almost every climatic advantage in favor of the use of fuel gas, but the success attained has been due to favorable rates and hard missionary work in the way of education and solicitation, rather than to climatic advantages. Aside from the usual household uses, gas is consumed in practically all the laundry, candy cooking, soldering, can-making and cannery industries thereabouts; and it has done this to the displacement, after competitive test, of every other available heating medium from which fuel can be made. The largest individual consumers are the canneries, which, during the season, consume an average of 20,000 cubic feet of gas per day. The increase of gas sales since the organization of the Marysville Gas & Electric Co. will probably average 10,000 cubic feet per month, and now the total output during the summer and fall months has reached the imposing total—considering the size of the town—of above 1,000,000 cubic feet per month. In 1899 the largest daily output was 23,000 cubic feet, or say 8,000,000 cubic feet per year, showing an apparent increase of but 2,000,000 cubic feet annually; but when it is remembered that the bulk of the lighting service is rendered in Marysville by electricity, the growth in the consumption of gas is remarkable.

NEVADA CITY is entitled to the distinction of possessing the third works erected in California for the manufacture of artificial gas, its predecessors being the San Francisco Gas Co., which began operations on February 11, 1854, and the Marysville Gas Co., which dates from 1858. The Nevada City Gas Works (which afterward became incorporated as the Nevada City Gas Co.) were built by Messrs. J. S. Kaneen and Amariah Pierce in 1859, thus outranking Portland, Ore., which started in 1860, and San Jose, Napa, Oakland and Stockton, which followed in the order named shortly after.

The Nevada City works were built by the gentlemen named by their own hands, with the assistance of those of a single helper. They themselves punched and riveted the holder and dug the pit therefor, and built the benches, condenser, scrubber and purifier—in fact, the whole works. It was a coal gas plant containing two retorts in a bench, there being two benches. The retorts were six or seven feet in length by a width of two feet and a height of 12 inches. The condenser was of the skeleton type, made of 3-inch cast iron pipe standing about three feet high with eight or ten bends. The purifier was a simple wooden box, 4x6 feet in size and 3 feet deep, in which slack lime was used as a purifying agent. The scrubber was of iron, also 4x6 feet in size, but standing .. feet high, and near the top of which was placed a basin of cast iron, the bottom of which was perforated through which water would run. The washer was similarly built, with the exception that it contained limbs and branches of trees in short places as well as coke, for the scrubber and washer were separate pieces of apparatus. From the washer gas was taken direct to the holder, which had a capacity of 4,500 cubic feet.

These pioneer works were located at the junction of Main and Coyote streets. Gas was made of pitch, pine and resin oil, the pine wood being cut into sticks one inch square and four feet long. These sticks were then put into formers consisting of D-shaped loops of wrought iron so as to shape the bundle of sticks into a form that would fit closely into the retort. Before being placed into the retort, however, each bundle would be saturated with resin oil, the period of retorting lasting for about one hour and a half. The distribution consisted of about two miles of 3-inch cast iron mains, the holder pressure being twenty-tenths of water. Eight and ten-foot burners were used. At the beginning, gas was sold for $5 per thousand, which was regarded as a fair rate, in view of the cost of wood, which probably averaged $11 per cord for selected pitch pine. Messrs. Charles H. Simpkins and Amariah Pierce were the owners of these works, which were afterward incorporated into the Nevada City Gas Co.

Mr. Kaneen, after supervising and building the plant, remained as its superintendent until 1863, when he went to Virginia City, Nev., to supervise the erection of the Virginia City

gas works. There pitch pine was also used, and although it cost $50 per cord, he had some consolation in the rate of $15 per thousand cubic feet which was charged for gas, and in the further knowledge that under his superintendency, in a single year, the Virginia City Gas Co. disbursed $92,000 in dividends after paying all new construction and operating expenses. In view of the fact that the plant represented an investment of probably less than $50,000, the owners felt the pricks of conscience so that during the year that followed the price was reduced to $12.50 per thousand, then by stages the reductions were to $10, $8 and $6, where it remained until Mr. Kaneen left the works in 1885 to enter the service of the Los Angeles Lighting Co.

As time wore on the Nevada City Gas Co. passed into the ownership of the wife of Mr. Meyers Allen, from whom it was purchased by the California Central Gas & Electric Co. on October 1, 1899. At that time illuminating gas sold for $5 per thousand and fuel gas at $3, in contrast with which we have the present rates of $2.50 and $2 respectively.

In **PETALUMA** for years the gas works pursued a career of all but disheartening failure from its very inception. As originally installed by the late Peter Donohue about the year 1867, it, at the very outset, encountered such an insuperable obstacle in the high price of materials that the public would not buy gas at the price charged, so perforce, the plant was closed down after running a comparatively short time. Beyond the fact that it was a coal gas plant, no data concerning the gas-making plant has been obtained. After a period of idleness the plant was bought by a Mr. Farmer and associates, who moved it to the lower part of town on Petaluma creek, where a new plant was erected, and by the time of its completion the business had been incorporated under the name of the Petaluma Gas Light Co., which continued in existence until the latter part of 1900, when it was purchased by the Petaluma Gas & Electric Co., thus putting an end to a long period of warfare and thus, for the first time, effecting a combination of the gas and electric interests of Petaluma.

In Mr. Donohue's original gas works about two miles of cast iron mains in 6-foot lengths, and which were brought around the Horn from Scotland, were used. They were 4 and 6 inches in diameter, and though they had been in the ground for over 30 years, when taken up a few years ago they were still in very good condition, with the exception of certain stretches that had been in very low ground. In these cases, the percolations of the brackish water of Petaluma creek had destroyed some of the pipe, which had been in use continually since the time of Mr. Farmer. The writer is not able to state what the price of gas was during Mr. Donohue's time, but in 1880 it was selling at $10 per thousand, which was afterward reduced to $8, then to $6 in 1887, then later to $5, and finally in 1899 to $2 for lighting purposes and $1.50 when used for fuel.

It was probably prior to 1887 that the plant passed into the hands of Mr. I. G. Wickersham, the banker of Petaluma, who enlarged the system by running more mains about the town. Coal gas was still being made according to the old system installed by Mr. Donohue when, in 1897, Mr. F. W. Van Syckle succeeded in inducing Mr. Wickersham to allow him to change the coal gas system to an oil gas system, using crude coal oil to generate gas through the medium of the Van Syckle process. The change was made as Mr. Van Syckle had recommended. About 30 gallons of oil were consumed per thousand cubic feet of gas manufactured, but most of this oil was used in heating the blast furnaces. The amount of gas produced per day varied from 4,000 to 4,500 cubic feet, and its illuminosity ranging from 23 to 24 candle-power.

The Van Syckle process was interesting, even if neither satisfactory nor profitable. In the gas which it produced a certain percentage of air was allowed to enter and mix with it in a simple mechanical combination. Then of an evening anywhere at the center of distribution or thereabouts, the gas jets in the stores would first whistle and burn together, then pop and revive and whistle again, in seeming inebrity. Yet at other times, when conditions were just right, a fair illumination would be given, but eternally there would be cast over all a pall of lamp black and soot that ever evidenced deepest mourning for the reprehensibility of this iniquitous gas.

These conditions were tolerated until 1902, when the Van Syckle plant was supplanted by the Santa Rosa-Petaluma Gas Transmission System. In the meantime, it should be stated, that with the acquirement of the Petaluma Gas Light Co. by the Petaluma Gas & Electric Co. in 1900, and the acquirement of the last-named company by the California Central Gas & Electric Co. in 1901, the lighting and power industries of Petaluma passed under the control of the California Gas & Electric Corporation.

SAN RAFAEL became possessed of a gas works about 28 years ago, when a gas, by courtesy called an illuminant, was made from gasoline in a little works located on the corner of A and Fourth streets which supplied a few blocks along the principal streets of the town. A few years later the works were bought by Mr. E. Lee, who moved them to the present location. On this property there was first erected a small holder that was supplied with coal gas from three small benches of three retorts each. It was a good gas that ran to 22 candle-power, and was made from Wallsend coal and purified with lime. The mains were extended up to a junction with the 3-inch mains that formerly distributed gasoline along Main street, and later they were continued over the best sections of the city up as far as Hotel Rafael and beyond in all directions. About this time the San Rafael Gas Co. was organized, its principal owners being Mr. Lee and Mr. Oliver Eldridge. Gas sold at $4 per thousand at the outset, but later it was reduced to $3.50, at which price it proved so popular as to necessitate repeated enlargements in the works, first by a bench of six retorts, then by another bench of sixes, and later two of the original benches of threes were torn down and another bench of six was erected. Some five years ago oil gas was introduced, the present equipment consisting of two Jones sets which produce 130,000 cubic feet and 80,000 cubic feet respectively of 22 candle-power gas per day of 20 hours.

SANTA ROSA'S first gas works were located near the north corner of Fifth and Mendocino streets, in a frame building since burned, where gasoline gas of the Maxim type was made, eventually to an output of from 10,000 to 12,000 cubic feet per day. Mr. J. S. Kaneen, now of the San Rafael Gas & Electric Co., and who is the most prominent gas man surviving those who were intimately identified with the development of the industry in Santa Rosa, is authority for the statement that this original plant was started and incorporated April 15, 1872, and that gas then sold for $4 per thousand. No record of the performance of the works was ever made, much less kept, nor is Mr. Kaneen able to remember the name of its principal owner or owners. After a couple of years, however, the works were moved to a lot that is now within the premises constituting the works of the Santa Rosa Lighting Co. About 1875 the system was changed to a coal gas plant originally using Wallsend, costing $14 per ton, and another Australian, or possibly a Japanese coal that contained an inordinate amount of sulphur. At that time coal for Santa Rosa was taken by barge from San Francisco to Donohoe's Landing on the Napa river and thence by rail to Santa Rosa, for the then so-called Donohoe road was not completed to Tiburon. The works contained three cast iron D-shaped retorts, a condenser consisting of 6-inch return bend iron pipes standing 12 feet high, and a wooden box purifier in which water-slacked lime was used as a purifying material. A 20 candle-power gas was produced.

In the meantime the business has been incorporated as the Santa Rosa Gas Co., its principal owners being Mr. John

A. Paxton, since deceased, Mr. John E. Ayer, also of Santa Rosa and who is now dead, and Mr. A. A. Curtis, now of San Rafael. In 1876 Mr. Kaneen purchased the interest held in the company by Mr. Ayer, and shortly thereafter another bench of threes was added. Still later the latter was finished, making two sets of threes that were installed by Mr. Kaneen. The first superintendent of the plant was a man by the name of Bennett, who was succeeded by Mr. Shackelford, and who, in turn, was succeeded by Mr. Center, now of Los Angeles.

The comparatively high price of coal made gas an expensive commodity, and much was done under Mr. Kaneen's direction to reduce the cost of its production. For an entire year later in the '70s gas was made exclusively from the wood of the red fir, costing $4.50 per cord on the grounds of Guerneville, or approximately $10 per cord delivered at Santa Rosa. This was very choice wood, especially selected from old trees that were rich in resin, with the result that 14,000 to 18,000 cubic feet of 20 candle-power gas was made from a cord of wood. Some pitch pine was also used, but it was very expensive, although it produced no less than 23,000 cubic feet of gas per cord. This statement is, however, merely an estimate, for the pitch pine made gas so rapidly that it was not possible to meter it accurately with the facilities at hand.

For a time gas was made from the refuse of the wineries and vineyards thereabouts. Grapevines, sticks, stalks, leaves and litter would be taken from the vineyards, and the pulp and seed from the crushed grapes would be taken from the wineries and spread out in the sun to dry. It was a hard task to dry this material thoroughly; in fact, drying was the main difficulty in using it, but when once dried and used as wood in the retorts, it would make from 5,000 to 7,000 cubic feet of 18 candle-power gas per wagon load. It was while using this refuse from the wine that Mr. Kaneen resorted to the use of crude oil to assist the generation of gas. Special pots of cast iron and measuring about 12x14x8 inches were made and filled two-thirds full of crude oil, then leveled off to the top with sawdust, after which one of the pots was shoved into each retort. The latter was then filled with the grapevine refuse, or with turf, or sawdust or wood, or "any old thing," and a good gas—also much tar—would result. The oil would be consumed down to a honeycomb, sponge-like mass, that would cover the bottom of the pot to a depth of an inch or more. Oil pots were sometimes used in making gas from wood, the wood being sawed up into strips about an inch square and 4 feet long, in which event wood costing $4 a cord and preferably of fir, could be used advantageously. Peruvian oil costing $2.25 per barrel in San Francisco was used exclusively. It should be emphasized that the making of gas from these materials was not done of choice, but of necessity arising from the absence of what might be determined legitimate gas-making materials. Indeed, the use of grape pomace, etc., was not only unprofitable, but the pomace would cool the retorts to such an extent that gas could be made only with exceeding difficulty.

The gas so made continued to be sold at $4 per thousand, with a special price of $3.50 to large consumers, until 1886, when it was reduced to $3.50 and $3 respectively. In 1880 the distribution consisted of about three miles of mains, whence were supplied some 125 consumers through heaters. Mr. John Barr, now deceased, was superintendent of the works until 1887, when he was succeeded by Mr. Joseph P. Berry, now an attorney of Santa Rosa. The company pursued an even tenor of existence until 1886, when the advent of the electric light in Santa Rosa brought about a warfare which gave rise to fallacious beliefs on the part of the public that required almost 15 years of bitter struggle to eradicate. The history of the lighting industry in Santa Rosa is, therefore, replete with interest in that it instructs regarding some of the most egregious errors which may be committed by a well-intentioned but misguided public.

THE ELECTRICAL JOBBERS' GAME AT NIAGARA.

ILLUSTRATIONS BY H. P. WAYMAN OF WESTERN ELECTRIC CO., CHICAGO

Merriment was the order of things when the delegates to the Electrical Jobbers' meeting, held at Niagara Falls September 11th, 12th, 13th and 14th, assembled at Athletic Park to witness a game of baseball between teams selected from the delegates and guests of the convention. The affair was scheduled for September 13th, and promptly at 11 o'clock the members adjourned their business meeting and set out for the park, but not without first showing their appreciation of commercial conditions by pledging each other hearty support and voting to keep up prices.

The nines were pitted against each other as the Electrical Manufacturers against the Jobbers. Mr. Al DeVean acted as captain and catcher for the first team, and Mr. P. M. Fletcher filled a similar position with the other. The game was hotly contested and the players were wildly cheered by the rooters, especially by the ladies, who made up a large percentage of the spectators. Hair-splitting arguments and protests against the umpire's decisions, mixed with a plentiful supply of good-

HALL REACHES FOR A HIGH BALL OVER FIRST

natured banter, kept things going lively for the nine innings through which the game lasted. Appeals to private interests were not neglected, and several of the jobbers threatened to take away their "business" from the manufacturers unless they were given a fair deal with the ball. The exact score is somewhat in doubt, although the jobbers unhesitatingly credited themselves with the victory. The game was thoroughly enjoyed and served to keep up the spirit of fun induced by the tug-of-war of the preceding day.

Important experiments are being carried on by the naval authorities at Portsmouth to ascertain the extent of the steaming properties of Welsh coal which has been improved by storage in the sea. Eighteen months ago iron crates, each containing two tons of coal, were sunk in the big basin in the dockyard. At the same time a similar quantity of coal was carefully stored in the open air at a coaling point and sheltered by tarpaulins. At intervals of six months two-ton samples of each storage have been taken carefully and burned. The results have shown conclusively that by the submarine storage of coal its calorific value steadily increases, while by storage in the open air a decided decrease is shown. At naval coaling stations in the tropics the decrease in calorific value is very great.—"Mining and Scientific Press."

APPEALS TO UMPIRE DEBERVOISE WERE MADE IN VAIN

GRAY'S DELIVERY WAS "SUMPIN FIERCE."

FLETCHER TRIES TO KEEP BACK THE TEARS AFTER A BAD DECISION

INDUSTRIAL.

THE HEWITT MACHINERY COMPANY OF SAN FRANCISCO,

A new concern, with William A. Hewitt, the well known machinery man, at its head, has certainly burst into the limelight with startling rapidity. They have erected a large warehouse at the northwest corner of Twenty-second and Indiana streets, where they have an immense stock of the latest and most improved types of the various machines for which they are the Pacific Coast representatives. Among these may be mentioned the Atlas engines and boilers, Blaisdell air compressors in all types and sizes, Jeffrey "Badger" rock drills, Shaw eclipse air hammer, rock drills and drill sharpeners, Chalmers and Williams' general mill and mining machinery, and Kilbourne and Jacobs' ore cars, skips and cages. They also carry a splendid line of steam and electric hoists. The Shaw drill, mentioned above, on September 3rd, at Victor, Colo., won in competition with six different makes of drills, boring a hole in the rock twenty-six feet, five and three-eighths inches (26 ft. 5⅜inches) in fifteen minutes.

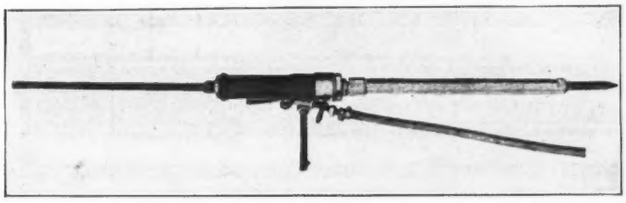

FIG. 1

Fig. 1 shows the drill used in this contest, a Shaw No. 2 dry machine, ready for operation, drilling uppers, without column or arm, and using the automatic feed device operated with compressed air. It can be placed in any part of a mine without any trouble.

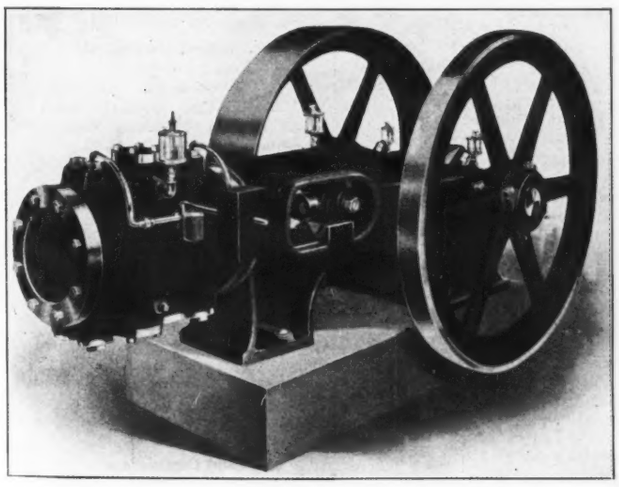

FIG. 2

Fig. 2 shows a single belt driven air compressor, a type made by the Blaisdell Machinery Company, of Bradford, Pa., and represented here by The Hewitt Machinery Company. The cut gives a good idea of the machine's simplicity.

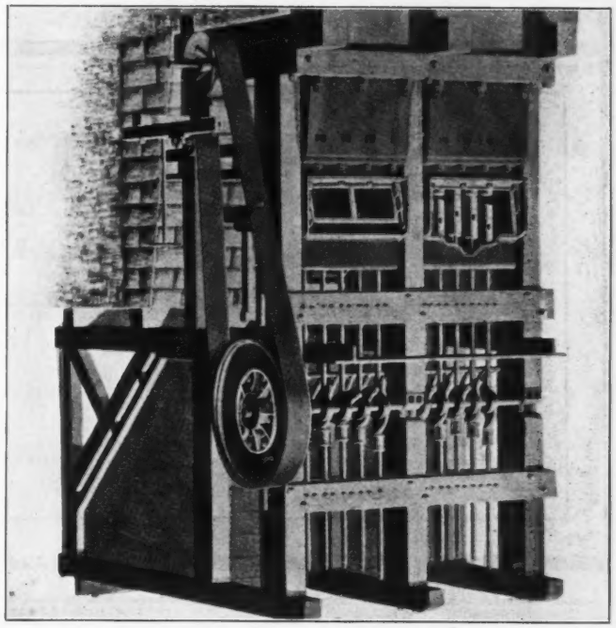

FIG. 3

Fig. 3 shows Chalmers & Williams' ten-stamp battery with mortars set on cast iron blocks and concrete foundation. These gravity stamp batteries are built with either five or ten stamps on one cam shaft, which is made of hammered iron, and can be started or stopped by means of a tightener, shown in the cut, without affecting the other machinery in the mill.

TANTALUM MINERALS.

In the recent report of the United States Geological Survey, several instances were given of the occurrence of tantalum minerals in the States. The report mentions some discovered at a feldspar quarry at Henryton, Carroll County, about twenty-eight miles from Baltimore. It occurs in irregular masses and rough crystals in the feldspar, and during the past year a considerable amount of this material was encountered in quarrying, but it was all thrown aside, as no one knew what the mineral was or its value. A specimen, however, was sent to the Westinghouse Company, at Pittsburg, and a partial analysis gives 38.19 per cent of tantalic oxide, and 13.21 per cent of niobic oxide. On account of the high atomic weight of the tantalum, the molecular ratio of the tantalic acid to the niobic acid is approximately 3.5 to 2. It is possible that the material analyzed has a certain amount of feldspar mixed with the taltalum mineral, which would account for the high percentage of silica. Near Glastonbury, Conn., an old feldspar quarry is being investigated as to the quantity of columbite and other tantalum mineral that may be found in this feldspar. Some material obtained from Tinton, South Dakota, was concentrated, and a heavy black mineral was obtained, with cassiterite and scheelite as concentrates from the Wifley table, which, upon analysis, gave 44 per cent of tantalic oxide and 30.5 per cent of niobic oxide, these determinations having been made by Dr. W. F. Hillebrand, of the United States Geological Survey. The specific gravity of the mineral was determined to be 6.8. In 1904 there was a small production of columbite, one of the tantalum minerals, but in 1905 the production was still smaller.

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